# MobileNext Broadband Gateway

## MobileNext Broadband Gateway Configuration Guide

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*MobileNext Broadband Gateway Configuration Guide*

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The information in this document is current as of the date listed in the revision history.

YEAR 2000 NOTICE

Juniper Networks hardware and software products are Year 2000 compliant. Junos OS has no known time-related limitations through the year 2038. However, the NTP application is known to have some difficulty in the year 2036.

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# Abbreviated Table of Contents

# Table of Contents

 

 

 

 

 

# List of Figures

# List of Tables

# About This Guide

This preface provides the following guidelines for using the *MobileNext Broadband Gateway Configuration Guide*:



## Junos Documentation and Release Notes

For a list of related Junos documentation, see http://www.juniper.net/techpubs/software/junos/ .

If the information in the latest release notes differs from the information in the documentation, follow the *Junos Release Notes.*

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Juniper Networks supports a technical book program to publish books by Juniper Networks engineers and subject matter experts with book publishers around the world. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration using the Junos operating system (Junos OS) and Juniper Networks devices. In addition, the Juniper Networks Technical Library, published in conjunction with O'Reilly Media, explores improving network security, reliability, and availability using Junos OS configuration techniques. All the books are for sale at technical bookstores and book outlets around the world. The current list can be viewed at http://www.juniper.net/books .

## Objectives

This guide provides an overview of the mobility features of the Junos OS on the MobileNext Broadband Gateway and describes how to configure these properties on the mobile platform.

NOTE: For additional information about Junos OS—either corrections to or information that might have been omitted from this guide—see the software release notes at http://www.juniper.net/.

## Audience

This guide is designed for mobile network administrators who are configuring and monitoring a Juniper Networks MX Series router functioning as a MobileNext Broadband Gateway.

To use this guide, you need a broad understanding of networks in general, the Internet in particular, networking principles, and network configuration. You must also be familiar with one or more of the following Internet routing protocols:

- Border Gateway Protocol (BGP)
- Distance Vector Multicast Routing Protocol (DVMRP)
- Intermediate System-to-Intermediate System (IS-IS)
- Internet Control Message Protocol (ICMP) router discovery
- Internet Group Management Protocol (IGMP)
- Multiprotocol Label Switching (MPLS)
- Open Shortest Path First (OSPF)
- Protocol-Independent Multicast (PIM)
- Resource Reservation Protocol (RSVP)
- Routing Information Protocol (RIP)
- Simple Network Management Protocol (SNMP)

Personnel operating the equipment must be trained and competent; must not conduct themselves in a careless, willfully negligent, or hostile manner; and must abide by the instructions provided by the documentation.

## Supported Platforms

For the features described in this manual, the Junos OS currently supports the following platforms:

- MX240 router

- MX480 router
- MX960 router

## Using the Indexes

This reference contains two indexes: a complete index that includes topic entries, and an index of statements and commands only.

In the index of statements and commands, an entry refers to a statement summary section only. In the complete index, the entry for a configuration statement or command contains at least two parts:

- The primary entry refers to the statement summary section.
- The secondary entry, *usage guidelines*, refers to the section in a configuration guidelines chapter that describes how to use the statement or command.

## Using the Examples in This Manual

If you want to use the examples in this manual, you can use the **load merge** or the **load merge relative** command. These commands cause the software to merge the incoming configuration into the current candidate configuration. If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the **load merge** command.

If the example configuration does not start at the top level of the hierarchy, the example is a *snippet*. In this case, use the **load merge relative** command. These procedures are described in the following sections.

### Merging a Full Example

To merge a full example, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration example into a text file, save the file with a name, and copy the file to a directory on your routing platform.

   For example, copy the following configuration to a file and name the file **ex-script.conf**. Copy the **ex-script.conf** file to the **/var/tmp** directory on your routing platform.

```
system {
    scripts {
        commit {
            file ex-script.xsl;
        }
    }
}
interfaces {
    fxp0 {
        disable;
        unit 0 {
            family inet {
```

```
            address 10.0.0.1/24;
          }
        }
      }
    }
```

2. Merge the contents of the file into your routing platform configuration by issuing the **load merge** configuration mode command:

```
[edit]
user@host# load merge /var/tmp/ex-script.conf
load complete
```

### Merging a Snippet

To merge a snippet, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration snippet into a text file, save the file with a name, and copy the file to a directory on your routing platform.

   For example, copy the following snippet to a file and name the file **ex-script-snippet.conf**. Copy the **ex-script-snippet.conf** file to the **/var/tmp** directory on your routing platform.

```
commit {
  file ex-script-snippet.xsl; }
```

2. Move to the hierarchy level that is relevant for this snippet by issuing the following configuration mode command:

```
[edit]
user@host# edit system scripts
[edit system scripts]
```

3. Merge the contents of the file into your routing platform configuration by issuing the **load merge relative** configuration mode command:

```
[edit system scripts]
user@host# load merge relative /var/tmp/ex-script-snippet.conf
load complete
```

For more information about the **load** command, see the *Junos OS CLI User Guide*.

## Documentation Conventions

Table 1 on page xxxix defines notice icons used in this guide.

## Table 1: Notice Icons

| Icon | Meaning | Description |
|---|---|---|
|  | Informational note | Indicates important features or instructions. |
|  | Caution | Indicates a situation that might result in loss of data or hardware damage. |
|  | Warning | Alerts you to the risk of personal injury or death. |
|  | Laser warning | Alerts you to the risk of personal injury from a laser. |

Table 2 on page xxxix defines the text and syntax conventions used in this guide.

## Table 2: Text and Syntax Conventions

| Convention | Description | Examples |
|---|---|---|
| **Bold text like this** | Represents text that you type. | To enter configuration mode, type the**configure** command:<br><br>user@host> **configure** |
| `Fixed-width text like this` | Represents output that appears on the terminal screen. | `user@host>` **show chassis alarms**<br><br>`No alarms currently active` |
| *Italic text like this* | • Introduces or emphasizes important new terms.<br>• Identifies book names.<br>• Identifies RFC and Internet draft titles. | • A policy *term* is a named structure that defines match conditions and actions.<br>• *Junos OS System Basics Configuration Guide*<br>• RFC 1997, *BGP Communities Attribute* |
| *Italic text like this* | Represents variables (options for which you substitute a value) in commands or configuration statements. | Configure the machine's domain name:<br><br>[edit]<br>root@# **set system domain-name** *domain-name* |
| **Text like this** | Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components. | • To configure a stub area, include the **stub** statement at the **[edit protocols ospf area area-id]** hierarchy level.<br>• The console port is labeled **CONSOLE**. |
| < > (angle brackets) | Enclose optional keywords or variables. | **stub <default-metric** ***metric*****>;** |

Table 2: Text and Syntax Conventions *(continued)*

| Convention | Description | Examples |
|---|---|---|
| \| (pipe symbol) | Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity. | **broadcast \| multicast**<br><br>**(*string1* \| *string2* \| *string3*)** |
| # (pound sign) | Indicates a comment specified on the same line as the configuration statement to which it applies. | **rsvp { # Required for dynamic MPLS only** |
| [ ] (square brackets) | Enclose a variable for which you can substitute one or more values. | **community name members [ *community-ids* ]** |
| Indention and braces ( { } ) | Identify a level in the configuration hierarchy. | [edit]<br>routing-options {<br>  static {<br>  route default {<br>  nexthop *address*;<br>  retain;<br>  }<br>  }<br>} |
| ; (semicolon) | Identifies a leaf statement at a configuration hierarchy level. | |
| J-Web GUI Conventions | | |
| **Bold text like this** | Represents J-Web graphical user interface (GUI) items you click or select. | • In the Logical Interfaces box, select **All Interfaces**.<br>• To cancel the configuration, click **Cancel**. |
| > (bold right angle bracket) | Separates levels in a hierarchy of J-Web selections. | In the configuration editor hierarchy, select **Protocols>Ospf**. |

## Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can send your comments to **techpubs-comments@juniper.net**, or fill out the documentation feedback form at https://www.juniper.net/cgi-bin/docbugreport/ . If you are using e-mail, be sure to include the following information with your comments:

- Document or topic name
- URL or page number
- Software release version (if applicable)

## Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or JNASC support contract,

or are covered under warranty, and need postsales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the JTAC User Guide located at http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf .
- Product warranties—For product warranty information, visit http://www.juniper.net/support/warranty/ .
- JTAC Hours of Operation —The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

## Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- Find CSC offerings: http://www.juniper.net/customers/support/
- Find product documentation: http://www.juniper.net/techpubs/
- Find solutions and answer questions using our Knowledge Base: http://kb.juniper.net/
- Download the latest versions of software and review release notes: http://www.juniper.net/customers/csc/software/
- Search technical bulletins for relevant hardware and software notifications: https://www.juniper.net/alerts/
- Join and participate in the Juniper Networks Community Forum: http://www.juniper.net/company/communities/
- Open a case online in the CSC Case Management tool: http://www.juniper.net/cm/

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: https://tools.juniper.net/SerialNumberEntitlementSearch/

## Opening a Case with JTAC

You can open a case with JTAC on the Web or by telephone.

- Use the Case Management tool in the CSC at http://www.juniper.net/cm/ .
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, visit us at http://www.juniper.net/support/requesting-support.html

PART 1

# Overview

CHAPTER 1

# System Architecture

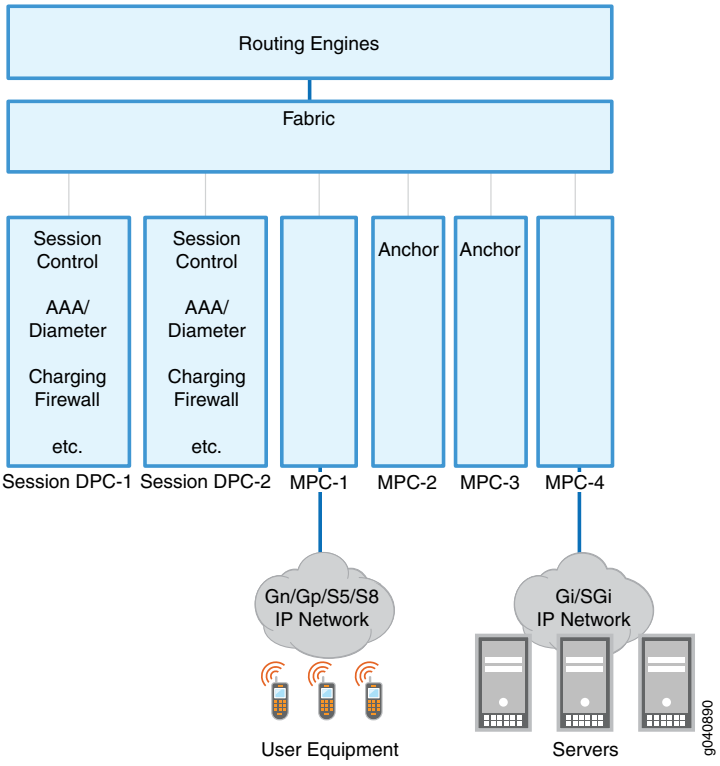
## Overview of Broadband Gateway System Architecture

The distinctive architecture of the MobileNext Broadband Gateway allows the functions of the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW) in 2G, 3G, and 4G architectures to combine with a typical provider edge (PE) router. Service chaining helps with scaling and lets the broadband gateway process mobile traffic without involving the Routing Engine.

Figure 1 on page 4 shows the main hardware components of the broadband gateway. This is a typical configuration: minimally, one session Dense Port Concentrator (DPC) is required and one interface DPC or Modular Port Concentrator (MPC). This configuration shows a more typical configuration for redundancy and other routing functions:

- Routing Engines—These components exercise overall control of the chassis.
- Fabric—The heart of the chassis, the fabric allows all of the boards to communicate.
- Session DPCs—Also often called Service DPCs, these boards do not have external interfaces, but instead provide services for packets flowing through the system. Some session DPCs are designated *anchor* DPCs for control plane purposes.
- Interface DPCs or MPCs—These boards have external interfaces and can face packet networks or the mobile network. Some of these MPCs are designated anchor MPCs for user (bearer) data flows. All interfaces can use a single IP address.

### Figure 1: The Broadband Gateway System Architecture



An *anchor* session DPC is where mobile control plane functions occur for a particular subscriber. The anchor interface DPC or MPC is where the processing for a specific GPRS tunneling protocol (GTP) tunnel identifier range occurs.

A key feature of the broadband gateway architecture is that many services can be integrated into the system. It is important to note that these services can be performed in a single pass through the device. This simplifies deployment scenarios and reduces requirements for space, latency, power, cooling, and so on. Because everything is all in one system, there are no interoperability issues and the same network management system can be used.

The broadband gateway can support 2G, 3G, and 4G subscribers at the same time, features fully redundant hardware and resilient software, and can scale bearer and control planes separately.

An overall resource manager watches operations concerning the resource management clients (the board in the chassis slots) and server (the active Routing Engine) on the broadband gateway.

NOTE: **You do not configure the resource manager for the broadband gateway. The process runs automatically.**

**Related Documentation**

- Overview of Broadband Gateway System Control Packet Flow on page 6
- Overview of Broadband Gateway Uplink Payload Packet Flow on page 7
- Overview of Broadband Gateway Downlink Payload Packet Flow on page 9
- Overview of Broadband Gateway as GGSN or P-GW on page 10

## Overview of Broadband Gateway System Control Packet Flow

The MobileNext Broadband Gateway uses session Dense Port Concentrators (DPCs) to handle all GPRS tunneling protocol, control (GTP-C) signaling requests from the user equipment and the GTP responses. New GTP sessions are anchored on a selected session DPC, and all control plane functions are handled by the same session DPC. In this example, the mobile and packet network interfaces are all housed in Modular Port Concentrators (MPCs).

Figure 2: Broadband Gateway GTP Signaling Packet Flow

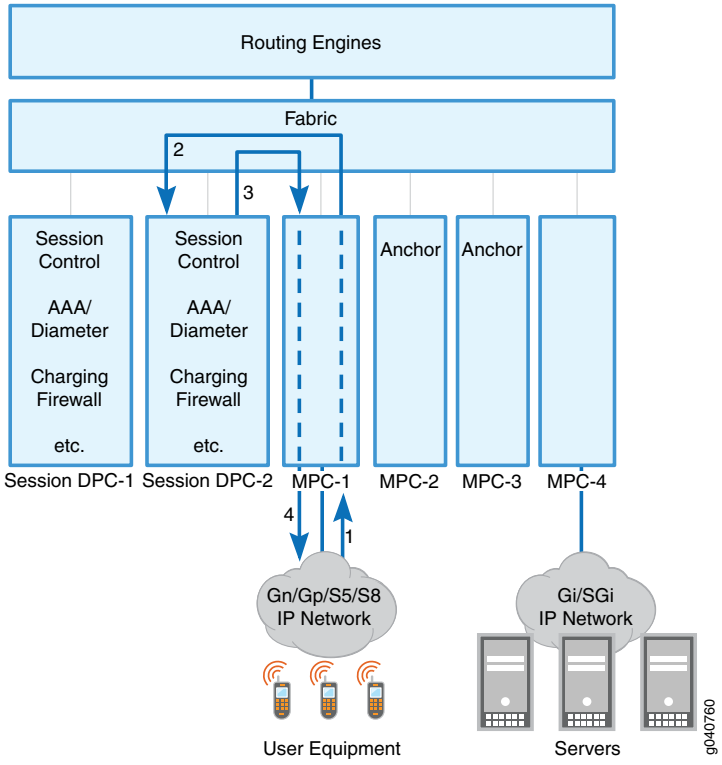



Figure 2 on page 6 shows the four steps that GTP-C signaling packets take through the broadband gateway:

1. An attached user equipment device activates a session and sends a Create Session request GTP-C signaling packet to a mobile interface on the broadband gateway.
2. The Gn/Gp or S5/S8 interface MPC parses the GTP-C packet based on the outer IP address and selects a session DPC for the new session. The MPC then sends the GTP-C signaling packet through the fabric to a session DPC that will anchor the session for control purposes. The session DPC performs the admission control, authentication, authorization, and accounting (AAA), Dynamic Host Configuration Protocol (DHCP) and charging operations required.

3. If the session is accepted, the session DPC sends a create session reply GTP-C signaling packet to the interface MPC that received the GTP message.
4. The Gn/Gp or S5/S8 interface MPC sends the GTP-C response back to the user equipment.

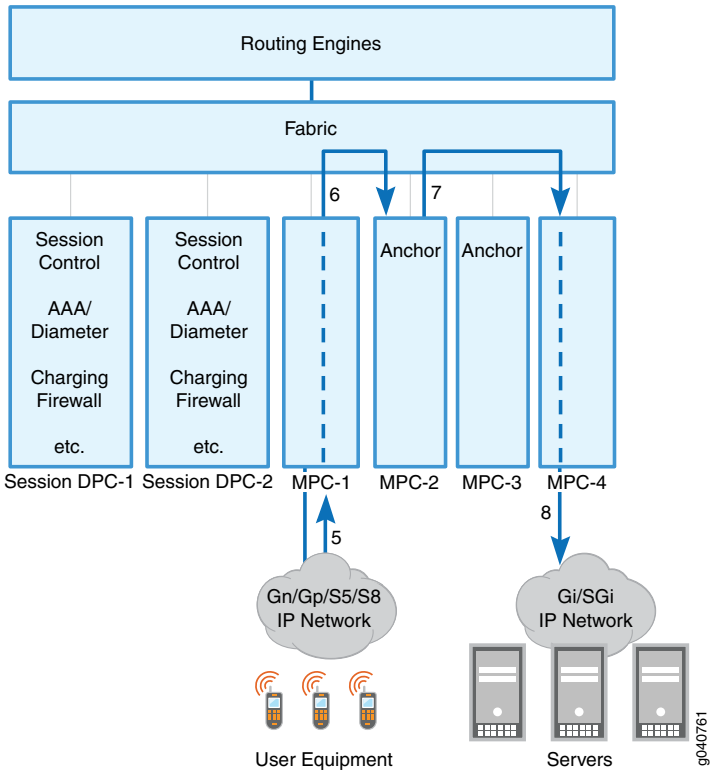
**Related Documentation**

- Overview of Broadband Gateway System Architecture on page 4
- Overview of Broadband Gateway Uplink Payload Packet Flow on page 7
- Overview of Broadband Gateway Downlink Payload Packet Flow on page 9
- Overview of Broadband Gateway as GGSN or P-GW on page 10

## Overview of Broadband Gateway Uplink Payload Packet Flow

The MobileNext Broadband Gateway uses interface Modular Port Concentrators (MPCs) or Dense Port Concentrators (DPCs) to handle all uplink user payload packet flow requests from user equipment. All user traffic flows through the anchor interface MPC or DPC. In this example, the mobile and packet network interfaces are all housed in MPCs.

Figure 3: Broadband Gateway Uplink User Packet Flow



After the GPRS tunneling protocol control (GTP-C) packets establish a session, Figure 3 on page 7 shows the next four steps that the uplink user payload GTP user plane (GTP-U) packets take through the broadband gateway:

5. An attached user equipment device sends an uplink payload GTP-U packet to a mobile interface on the broadband gateway.

6. The interface MPC sends the GTP-U packet to the interface MPC chosen during the control phase to anchor the user session data flow. The anchor MPC performs all subscriber-specific access control, policing, statistic gathering, and other parameters set for the subscriber based on the inner IP address in the GTP-U packet.

7. The anchor interface MPC sends the user packet to the uplink MPC that leads to the correct IP packet network.

8. The uplink interface MPC sends the user payload packet to the IP network on the Gi or SGi interface.

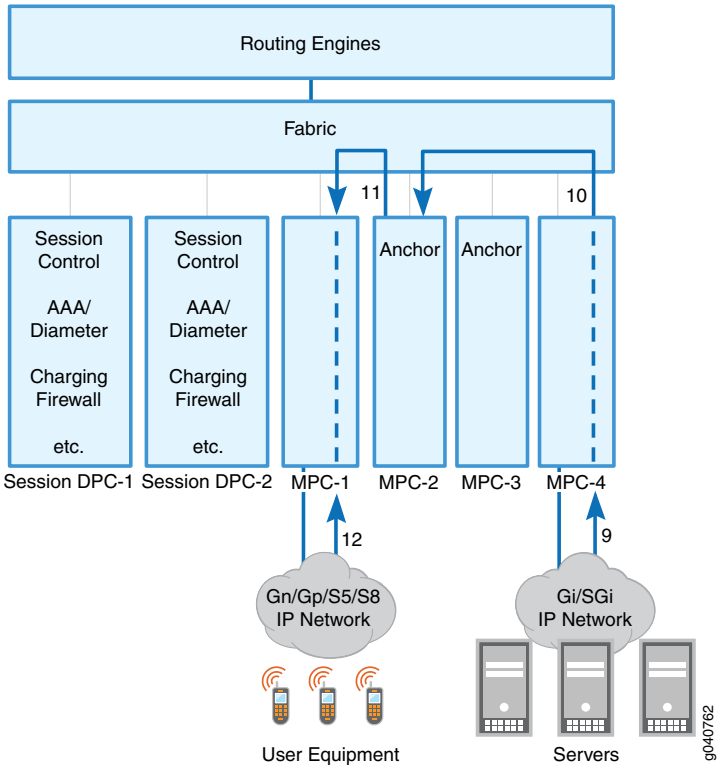
**Related Documentation**

- Overview of Broadband Gateway System Architecture on page 4
- Overview of Broadband Gateway System Control Packet Flow on page 6
- Overview of Broadband Gateway Downlink Payload Packet Flow on page 9
- Overview of Broadband Gateway as GGSN or P-GW on page 10

## Overview of Broadband Gateway Downlink Payload Packet Flow

The MobileNext Broadband Gateway uses interface Modular Port Concentrators (MPCs) or Dense Port Concentrators (DPCs) to handle all downlink user payload packets flows requests from an IP network back to the user equipment. All user traffic flows through the anchor interface MPC or DPC. In this example, the mobile and packet network interfaces are all housed in MPCs.

Figure 4: Broadband Gateway Downlink User Packet Flow




After the GPRS tunneling protocol, control (GTP-C) packets establish a session, and packets flow uplink to the broadband gateway, Figure 4 on page 9 shows the last four steps that the downlink user payload GTP user plane (GTP-U) packets take through the broadband gateway:

9. The IP network sends a downlink data packet to a mobile Gi or SGi interface on the broadband gateway.

10. The interface MPC sends the downlink packet to the interface MPC chosen during the control phase to anchor the user session data flow. The anchor MPC performs all subscriber-specific access control, policing, statistic gathering, and other parameters set for the subscriber.

11. The anchor interface MPC sends the encapsulated GTP-U packet to the downlink interface that leads to the correct user device.

12. The downlink interface MPC sends the GTP-U user payload packet to the user device.

**Related Documentation**

- Overview of Broadband Gateway System Architecture on page 4
- Overview of Broadband Gateway System Control Packet Flow on page 6
- Overview of Broadband Gateway Uplink Payload Packet Flow on page 7
- Overview of Broadband Gateway as GGSN or P-GW on page 10

## Overview of Broadband Gateway as GGSN or P-GW

You can configure the MobileNext Broadband Gateway as either a 3G gateway GPRS support node (GGSN) or 4G Packet Data Network Gateway (P-GW). The GGSN or P-GW is the interconnection point between the public land mobile network (PLMN) and a particular Packet Data Network (PDN) such as the Internet or a corporate intranet.

In 3G networks, the GGSN maintains a one-to-many relationship with serving GPRS support nodes (SGSNs), which may be in either the home public land mobile network (HPLMN) or visited public land mobile network (VPLMN) for roaming subscribers. The SGSN and GGSN communicate with each other over Gn interface, which utilizes GPRS tunneling protocol, control plane (GTP-C) (version 0 and version 1) and GPRS tunneling protocol, user plane (GTP-U) for data traffic.

In 4G networks, the P-GW maintains a one-to-many relationship with Serving Gateway (S-GW), which can be in either the home PLMN or visiting PLMN for roaming subscribers. The S-GW and P-GW communicate with each other over the S5 interface for non-roaming subscribers and S8 interface for roaming subscribers. Both S5 and S8 interfaces make use of GTP-C (version 2) for control plane and GTP-U for data traffic.

The application framework for the broadband gateway is composed of a set of applications and protocols that interact with the external servers and provide the following configurable services for subscribers:

- Mobile subscriber authentication with RADIUS.
- Charging and accounting with GTP prime Charging Data Records (CDRs) generation and billing, or through RADIUS accounting.
- Policy enforcement using local configuration.

You configure the GGSN or P-GW for the broadband gateway as part of a *unified edge* configuration. The unified edge brings all mobile subscriber–related services under one structure. A unified edge gateway has its own set of parameters for AAA, charging, APNs, and so on.

**Related Documentation**

- Overview of Broadband Gateway System Architecture on page 4
- Configuring Broadband Gateway Home PLMNs and Gateways on page 11

## Understanding Mobile User Types

There are different types of users in a mobile network. These are distinguished by comparing the home public land mobile network (HPLMN) list configured on the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW) and the PLMNs received from users in headers and control messages.

Based on a comparison of PLMNs, the mobile user falls into one of three categories:

- Home user—The subscriber, the GGSN or P-GW, and SSGN or S-GW are all in the same PLMN.
- Roaming user—The subscriber and GGSN or P-GW belong to the same PLMN, but the SSGN or S-GW are in a different PLMN.
- Visiting user—The subscriber and SGSN or S-GW belong to the same PLMN, but the GGSN or P-GW are in a different PLMN.

**Related Documentation**

- Overview of Broadband Gateway System Architecture on page 4
- Configuring Broadband Gateway Home PLMNs and Gateways on page 11
- Configuring Broadband Gateway Local Policies Application on page 12

## Configuring Broadband Gateway Home PLMNs and Gateways

The MobileNext Broadband Gateway establishes a context and framework for mobile operations under the unified edge. The basic mobile framework unit is the gateway, which can be used as either a 3G gateway GPRS support node (GGSN) or 4G Packet Data Network Gateway (P-GW). The gateway also has one or more home public land mobile networks (HPLMNs) associated with it.

Before you begin configuring HPLMNs and gateways on the broadband gateway, you should have done the following:

- Configured access to the MobileNext Broadband Gateway

To establish the mobile context, configure a gateway. You also configure a list of HPLMNs that this gateway and its access point names (APNs) recognize. The HPLMNs consist of the mobile country code (MCC) and mobile network code (MNC).

NOTE: **At initial release, the broadband gateway supports only one gateway.**

To configure the gateway and HPLMN list:

1. Configure a name for the gateway.

   **[edit unified-edge gateways ggsn-pgw ]**
   **user@host# set** *MGB1*

NOTE: You can include dashes or underscores, but many special characters are not allowed in the gateway name.

2. Configure a list of HPLMNs for the gateway.

   **[edit unified-edge gateways ggsn-pgw MBG1]**
   **user@host# set home-plmn mcc *001* mnc *01***

NOTE: The MMC/MNC combination 00101 is reserved for test networks.

**Related Documentation**

- Understanding Mobile User Types on page 11
- Configuring Broadband Gateway Local Policies Application on page 12
- Overview of Broadband Gateway System Architecture on page 4
- Configuring General Gateway Trace Options on page 14
- Configuring Mobile Options Trace Options on page 16
- Configuring Resource Manager Trace Options on page 18

## Configuring Broadband Gateway Local Policies Application

The MobileNext Broadband Gateway associates a number of locally configured policies with a configured gateway. These policies are used for connection admission control and service-related parameters.

Before you begin configuring local policies on the broadband gateway, you should have done the following:

- Configured access to the MobileNext Broadband Gateway

You configure the local policies at the **[edit unified-edge cos-cac]** hierarchy level and apply the profiles at the **[edit unified-edge local-policies *local-policies-name*]** hierarchy level. You can configure many policy profiles, but you can apply only one of each type at a time to the gateway as a whole.

To associate the gateway with local policy profiles:

1. Use a name for the local policies profile.

   **[edit unified-edge local-policies *local-policy-profile-1*]**

2. Associate the gateway with a classifier profile by user type.

   **[edit unified-edge local-policies *local-policy-profile-1*]**
   **user@host# set classifier-profile *home-classifier-profile-1***
   **user@host# set roamer-classifier-profile *roamer-classifier-profile-1***
   **user@host# set visitor-classifier-profile *visitor-classifier-profile-1***

3. Associate the gateway with a class-of-service policy profiles by user type.

```
[edit unified-edge local-policies local-policy-profile-1]
user@host# set policy-profile home-classifier-policy-profile-1
user@host# set roamer-policy-profile roamer-classifier-policy-profile-1
user@host# set visitor-policy-profile visitor-policy-profile-1
```

4. Associate the gateway with the resource threshold profile used to define admission control for managing system overload conditions.

```
[edit unified-edge local-policies local-policy-profile-1]
user@host# set resource-threshold-profiles resource-threshold-profile-1
```

5. Associate the gateway with the downlink bandwidth pool.

```
[edit unified-edge local-policies local-policy-profile-1]
user@host# set dl-bandwidth-pool bw-pool-downlink-1
```

6. Associate the gateway with the uplink bandwidth pool.

```
[edit unified-edge local-policies local-policy-profile-1]
user@host# set ul-bandwidth-pool bw-pool-uplink-1
```

**Related Documentation**

- Understanding Mobile User Types on page 11
- Overview of Broadband Gateway System Architecture on page 4
- Configuring General Gateway Trace Options on page 14
- Configuring Mobile Options Trace Options on page 16
- Configuring Resource Manager Trace Options on page 18

## Configuring Broadband Gateway Call Rate Statistics

The MobileNext Broadband Gateway records statistics about the rate of calls through the gateway. You can configure parameters relating to the recording of these statistics at the gateway level.

Before you begin configuring call rate statistics on the broadband gateway, you should have done the following:

- Configured a list of home public land mobile networks (HPLMNs) and a gateway on the MobileNext Broadband Gateway

To configure the option values for call rate statistics:

1. Configure the history interval value for collecting call rate statistics.

```
[edit unified-edge gateways ggsn-pgw MBG1 call-rate-statistics]
user@host# set history 10
```

NOTE: Enter a value from 1 through 20 intervals to keep call rate statistics.

2. Configure the interval for collecting call rate statistics.

```
[edit unified-edge gateways ggsn-pgw MBG1 call-rate-statistics]
user@host# set interval 5
```

NOTE: Enter a value in minutes from 5 through 120 minutes.

**Related Documentation**

- Configuring Broadband Gateway Home PLMNs and Gateways on page 11
- Configuring General Gateway Trace Options on page 14
- Configuring Mobile Options Trace Options on page 16
- Configuring Resource Manager Trace Options on page 18

## Verifying the Gateway Configuration

**Purpose** Display information about the gateway configuration.

**Action**

- To display information about the call rate and general statistics on the gateway:

  user@host> **show unified-edge ggsn-pgw call-rate statistics**
  user@host> **show unified-edge ggsn-pgw statistics**

- To clear information about the general statistics on the gateway:

  user@host> **clear unified-edge ggsn-pgw statistics**

- To display information about the status of the gateway:

  user@host> **show unified-edge ggsn-pgw status**
  user@host> **show unified-edge ggsn-pgw status preemption-list**

- To clear information about the subscriber peers on the gateway:

  user@host> **clear unified-edge ggsn-pgw subscribers peer**

- To display information about the resources on the gateway:

  user@host> **show unified-edge ggsn-pgw resource-manger clients**

**Related Documentation**

- Configuring Broadband Gateway Home PLMNs and Gateways on page 11
- Configuring Broadband Gateway Local Policies Application on page 12
- Configuring Broadband Gateway Call Rate Statistics on page 13

## Configuring General Gateway Trace Options

General gateway tracing operations record detailed messages about the operation of configured gateways on the MobileNext Broadband Gateway.

General gateway trace options are related to overall gateway operation. You can specify which trace operations are logged by including specific tracing flags and levels.

Table 3 on page 15 describes the flags relating to the mobile unified edge that you can include at the **[edit unified-edge gateways ggsn-pgw *gateway-name* traceoptions flag]** hierarchy level.

### Table 3: General Gateway Trace Flags

| Flag | Description |
|---|---|
| **all** | Trace everything. |
| **bulkjob** | Trace resources. |
| **config** | Trace configuration events. |
| **cos-cac** | Trace CoS and CAC events. |
| **ctext** | Trace user equipment, PDN, or bearer context events. |
| **fsm** | Trace FSM events. |
| **gtpu** | Trace GTP-U events. |
| **ha** | Trace high availability events. |
| **init** | Trace events related to protocol daemon initialization. |
| **pfem** | Trace PFE manager events. |
| **stats** | Trace stats events. |
| **waitq** | Trace waitq events. |

Table 4 on page 15 describes the levels you can include.

### Table 4: Trace Levels

| Level | Description |
|---|---|
| **all** | Match all levels. |
| **error** | Match error conditions. |
| **info** | Match informational messages. |
| **notice** | Match conditions that should be specially handled. |
| **verbose** | Match verbose messages. |
| **warning** | Match warning messages. |

To configure tracing options for general gateway events:

1. Specify that you want to configure tracing options for general gateway events.

   [edit unified-edge gateways ggsn-pgw *gateway-name* ]
   user@host# **edit traceoptions**

2. Configure the filename for the trace file.

   [edit unified-edge gateways ggsn-pgw *gateway-name* traceoptions]
   user@host# **set file *general-gw-log***

3. (Optional) Configure the maximum size of each trace file.

   [edit unified-edge gateways ggsn-pgw *gateway-name* traceoptions]
   user@host# **set file size 100m**

   NOTE: When a trace file (for example, gateway-log) reaches its maximum size, it is renamed gateway-log.0, then gateway-log.1, and so on, until the maximum number of trace files is reached. The oldest archived file is then overwritten.

4. Configure the tracing flag.

   [edit unified-edge gateways ggsn-pgw *gateway-name* traceoptions]
   user@host# **set flag all**

   NOTE: Use care when tracing all operations on a gateway. This can have a performance impact.

5. Configure the tracing level.

   [edit unified-edge gateways ggsn-pgw *gateway-name* traceoptions]
   user@host# **set level error**

6. View the trace file.

   user@host# **file show /var/log/gateway-log**

**Related Documentation**

- Overview of Broadband Gateway System Architecture on page 4
- Configuring Broadband Gateway Home PLMNs and Gateways on page 11
- Configuring Broadband Gateway Local Policies Application on page 12
- Configuring Mobile Options Trace Options on page 16
- Configuring Resource Manager Trace Options on page 18

## Configuring Mobile Options Trace Options

Mobile options tracing operations record detailed messages about the operation of unified edge options on the MobileNext Broadband Gateway. Mobile options trace options are related to the processor daemon operation. You can specify which trace operations are logged by including specific tracing flags and levels.

Table 5 on page 17 describes the flags relating to the mobile unified edge that you can include at the **[edit unified-edge mobile-options traceoptions flag]** hierarchy level.

### Table 5: Mobile Options Trace Flags

| Flag | Description |
|---|---|
| **all** | Trace everything. |
| **configuration** | Trace configuration events. |
| **error** | Trace events related to catastrophic errors in the daemon. |
| **init** | Trace events related to protocol daemon initialization. |
| **protocol** | Trace protocol processing events. |

Table 6 on page 17 describes the levels you can include.

### Table 6: Trace Levels

| Level | Description |
|---|---|
| **all** | Match all levels. |
| **error** | Match error conditions. |
| **info** | Match informational messages. |
| **notice** | Match conditions that should be specially handled. |
| **verbose** | Match verbose messages. |
| **warning** | Match warning messages. |

To configure tracing options for mobile options:

1. Specify that you want to configure tracing options for mobile options.

   ```
   [edit unified-edge mobile-options]
   user@host# edit traceoptions
   ```

2. Configure the filename for the trace file.

   ```
   [edit unified-edge mobile-options traceoptions]
   user@host# set file mobile-options-log
   ```

3. (Optional) Configure the maximum size of each trace file.

   ```
   [edit unified-edge mobile-options traceoptions]
   user@host# set file size 100m
   ```

NOTE: When a trace file (for example, mobile-log) reaches its maximum size, it is renamed mobile-log.0, then mobile-log.1, and so on, until the maximum number of trace files is reached. The oldest archived file is then overwritten.

4. Configure the tracing flag.

   ```
   [edit unified-edge mobile-options traceoptions]
   user@host# set flag all
   ```

   NOTE: Use care when tracing all operations on a gateway. This can have a performance impact.

5. Configure the tracing level.

   ```
   [edit unified-edge mobile-options traceoptions]
   user@host# set level error
   ```

6. View the trace file.

   ```
   user@host# file show /var/log/mobile-options-log
   ```

**Related Documentation**

- Overview of Broadband Gateway System Architecture on page 4
- Configuring Broadband Gateway Home PLMNs and Gateways on page 11
- Configuring Broadband Gateway Local Policies Application on page 12
- Configuring General Gateway Trace Options on page 14
- Configuring Resource Manager Trace Options on page 18

## Configuring Resource Manager Trace Options

Resource management tracing operations record detailed messages about the operation of resource management clients and server on the MobileNext Broadband Gateway.

NOTE: You do not configure the resource manager for the broadband gateway. The process runs automatically.

Resource management trace options are divided into flags for the resource management *server* (the active Routing Engine) and the resource management *client* (the session Dense Port Concentrators [DPCs] and interface DPCs and Modular Port Concentrators [MPCs]). You can set server and client flags independently. You can specify which trace operations are logged by including specific tracing flags and levels.

Table 7 on page 18 describes the flags relating to the resource management server that you can include at the **[edit unified-edge resource-management server traceoptions flag]** hierarchy level.

### Table 7: Resource Management Server Trace Flags

| Flag | Description |
|---|---|
| **all** | Trace everything. |
| **communication** | Trace Infra code. |

Table 7: Resource Management Server Trace Flags *(continued)*

| | |
|---|---|
| **config** | Trace configuration code. |
| **gres** | Trace GRES code. |
| **info-manager** | Trace information management code. |
| **init** | Trace events related to data path daemon initialization. |
| **memory** | Trace memory management code. |
| **packet-steering** | Trace packet-steering code. |
| **resource-manager** | Trace resource management code. |
| **signal** | Trace signal handling code. |
| **state** | Trace state handling code. |
| **timer** | Trace timer code. |
| **ui** | Trace user interface code. |

Table 8 on page 19 describes the flags relating to the resource management client that you can include at the **[edit unified-edge resource-management client traceoptions flag]** hierarchy level.

Table 8: Resource Management Client Trace Flags

| Flag | Description |
|---|---|
| **all** | Trace everything. |
| **communication** | Trace IPC code. |
| **info-tables** | Trace information table code. |
| **infra** | Trace FSM and Infra code. |
| **memory** | Trace memory management code. |
| **redundancy** | Trace GRES code. |
| **resource-tables** | Trace resource table code. |

Table 9 on page 19 describes the levels you can include.

Table 9: Trace Levels

| Level | Description |
|---|---|

Table 9: Trace Levels *(continued)*

| | |
|---|---|
| **all** | Match all levels. |
| **error** | Match error conditions. |
| **info** | Match informational messages. |
| **notice** | Match conditions that should be specially handled. |
| **verbose** | Match verbose messages. |
| **warning** | Match warning messages. |

To configure tracing options for resource management operations:

1. Specify that you want to configure tracing options for resource management client or server operations.

   ```
   [edit unified-edge resource-management server]
   [edit unified-edge resource-management client]
   user@host# edit traceoptions
   ```

2. Configure the filename for the trace file.

   ```
   [edit unified-edge resource-management server traceoptions]
   [edit unified-edge resource-management client traceoptions]
   user@host# set file rm-log
   ```

3. (Optional) Configure the maximum size of each trace file.

   ```
   [edit unified-edge resource-management server traceoptions]
   [edit unified-edge resource-management client traceoptions]
   user@host# set file size 100m
   ```

   NOTE: When a trace file (for example, rm-log) reaches its maximum size, it is renamed rm-log.0, then rm-log.1, and so on, until the maximum number of trace files is reached. The oldest archived file is then overwritten.

4. Configure the tracing flag.

   ```
   [edit unified-edge resource-management server traceoptions]
   [edit unified-edge resource-management client traceoptions]
   user@host# set flag all
   ```

   NOTE: Use care when tracing all operations on a gateway. This can have a performance impact.

5. Configure the tracing level.

   ```
   [edit unified-edge resource-management server traceoptions]
   [edit unified-edge resource-management client traceoptions]
   user@host# set level error
   ```

6. View the trace file.

   user@host# file show /var/log/rm-log

**Related Documentation**

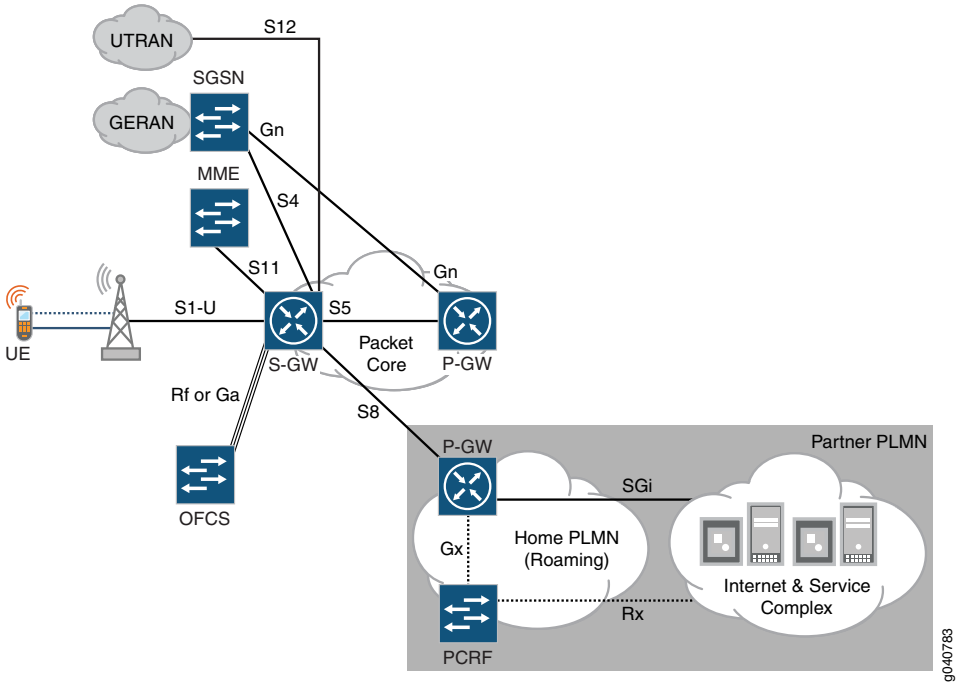
- Overview of Broadband Gateway System Architecture on page 4
- Configuring Broadband Gateway Home PLMNs and Gateways on page 11
- Configuring Broadband Gateway Local Policies Application on page 12
- Configuring General Gateway Trace Options on page 14
- Configuring Mobile Options Trace Options on page 16

## Serving Gateways and the MobileNext Broadband Gateway Overview

In a 4G mobile network, the MobileNext Broadband Gateway can function as a standalone Serving Gateway (S-GW), or collocate the S-GW on the same broadband gateway as a Packet Data Network Gateway (P-GW). Note that the collocated S-GW feature is only available on 4G configurations. You cannot configure the broadband gateway as a Serving GPRS Support Node (SGSN) as part of a General GPRS Support Node (GGSN).

The S-GW includes features that facilitate connection to the radio or mobile device side of the mobile network. Many of these functions involve maintaining the end-to-end connectivity between user equipment on the Radio Access Network (RAN) and gateway to IP-based services in the Packet Data Network (PDN) in an environment where users are constantly moving around. The key S-GW interfaces are shown in Figure 5 on page 21.

Figure 5: S-GW Interfaces on the Broadband Gateway



When the broadband gateway is configured as an S-GW, these S-GW functions include:

- Control interfaces between S-GW and SGSN (S4 interface), S-GW and P-GW (S5) and S-GW and Mobility Management Entity (MME) (S11)
- Data interfaces between S-GW and eNodeB (S1-U interface), S-GW and SGSN (S4), S-GW and P-GW, local and roaming (S5/S8), and RNC (S12)
- Support for S-GW Charging Data Records (CDRs)
- Idle mode signaling reduction
- Support for 2G and 3G access

NOTE: **There is no support for the S101, S103, or GXc interfaces on the broadband gateway.**

A key function of the broadband gateway S-GW is buffering and idle mode handling. When a downlink packet for an idle user device arrives, the S-GW buffers the packet and initiates paging toward to MME/SGSN on the S11 or S4 interface. When the user device moves to active mode, the packet is delivered.

Also, the broadband gateway S-GW uses indirect data forwarding during handover to make sure that uplink or downlink data is not dropped. The S-GW forwards the data and an end marker through indirect data tunnels, and sends end marker packets to ensure in-order data delivery.

The fundamental interface of the S-GW is the S1 interface. The X2 interface is related, but X2 is not configured on the S-GW because the X2 interface connects one eNodeB to another. The S1 interface connects an eNodeB to Evolved Packet Core (EPC), in particular, the S-GW. Both the X2 and S1 interfaces are IP-based and include separate user plane and control plane protocol stacks. Application protocols define the signalling messages and procedures sent across the X2 and S1 interfaces.

The S1 control plane runs between an eNodeB and a Mobility Management Entity (MME) and is called the S1-MME. Do not confuse the S1-MME (eNodeB-MME interface) with the S11 (S-GW-MME) interface, which carries GPRS tunneling protocol control (GTP-C) messages. On the other hand, the S1 user plane runs between the eNodeB and the S-GW and is called the S1-U interface and carries GTP user (GTP-U) payloads.

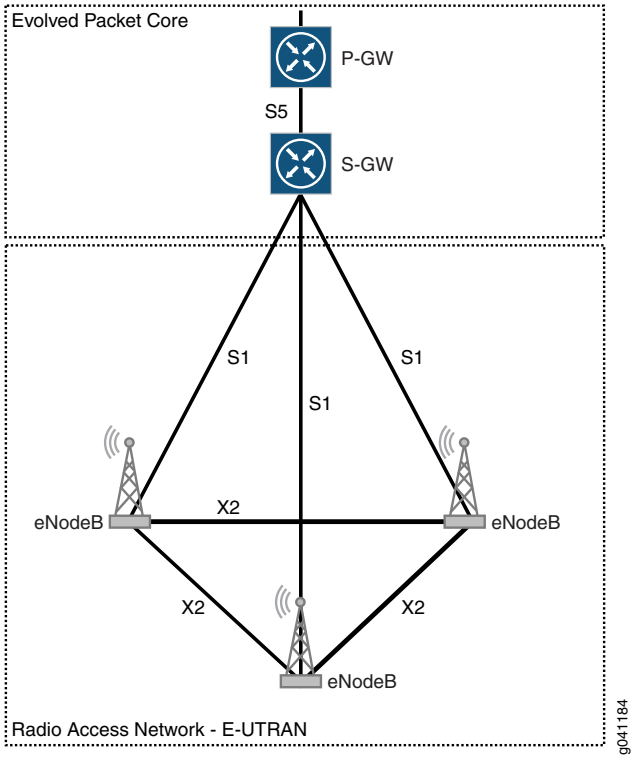
When the broadband gateway is configured as an S-GW, the S-GW provides the following hand-over capabilities:

- S1 interface (eNodeB to MME) hand-over with S-GW relocation
- S1 interface (eNodeB to MME) hand-over *without* S-GW relocation
- End marker packet support to downlink eNodeB when a path switch is made from the old eNodeB
- Indirect forwarding tunnels when there is no user plane available between source eNodeB and target eNodeB (or RNC)

- X2 interface (eNodeB to eNodeB) hand-over with S-GW relocation
- X2 interface (eNodeB to eNodeB) hand-over *without* S-GW relocation

Figure 6 on page 23 shows the relationship between the S1 and X2 interfaces.

### Figure 6: S-GW and the S1 and X2 Interfaces




**Related Documentation**

- Overview of Broadband Gateway System Architecture on page 4
- Overview of Standalone S-GW User Plane Packet Flow on page 24
- Overview of Collocated Gateways: Control Plane on page 27
- Overview of Collocated Gateways: User Plane on page 28
- MobileNext Broadband Gateway Configuration Overview on page 25
- Configuring an S-GW on a Broadband Gateway on page 29
- Configuring S-GW-Specific Profiles on page 31
- Configuring S-GW Traceoptions on page 32

## Overview of Standalone S-GW User Plane Packet Flow

The architecture of the MobileNext Broadband Gateway, when configured as a Serving Gateway (S-GW) allows GPRS tunneling protocol (GTP) packets to pass efficiently from input to output interface.

Figure 7: GTP-U Packet Flow Through Standalone S-GW

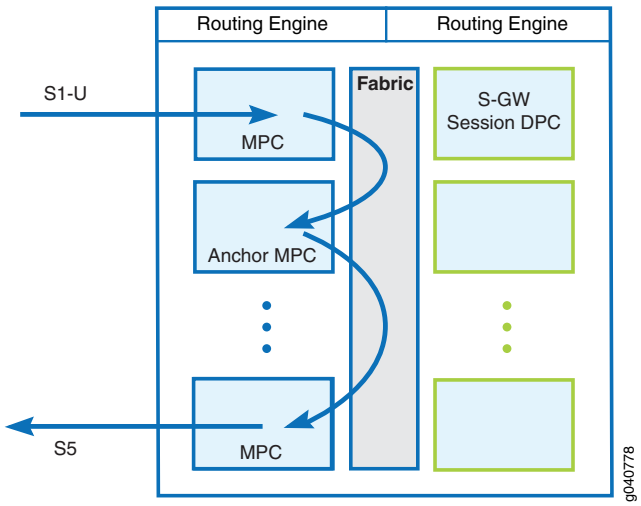



Figure 7 on page 24 shows the usual path of user packets (GTP-U) from eNodeB radio network (S1-U) to P-GW (S5) interfaces. Note that the user packet passes through the S-GW anchor Modular Port Concentrator (MPC) for that particular bearer. They do not flow through a service Packet Forwarding Engine unless absolutely necessary.

For user packet flows, the anchor MPC provides:

- Line rate GTP packet processing
- Stitching together of packet streams and packet forwarding
- Extremely low latency
- Hardware-based quality of service (QoS)
- Traffic counters and charging information

When necessary, the services Packet Forwarding Engine provides the following for the user packet flow:

- IP Security (IPsec)
- Internet Key Exchange (IKE)

NOTE: The broadband gateway can have other services Packet Forwarding Engines that are not associated with the S-GW.

**Related Documentation**

- Overview of Broadband Gateway System Architecture on page 4
- Serving Gateways and the MobileNext Broadband Gateway Overview on page 21
- Overview of Collocated Gateways: Control Plane on page 27
- Overview of Collocated Gateways: User Plane on page 28
- MobileNext Broadband Gateway Configuration Overview on page 25
- Configuring an S-GW on a Broadband Gateway on page 29
- Configuring S-GW-Specific Profiles on page 31
- Configuring S-GW Traceoptions on page 32

## MobileNext Broadband Gateway Configuration Overview

The MobileNext Broadband Gateway offers flexible configuration to best service mobile subscribers. Different users can utilize the same broadband gateway chassis as a Packet Data Network Gateway (P-GW), a Service Gateway (S-GW), or both.

### Figure 8: Collocated Gateways S-GW and P-GW Resources and Load Balancing

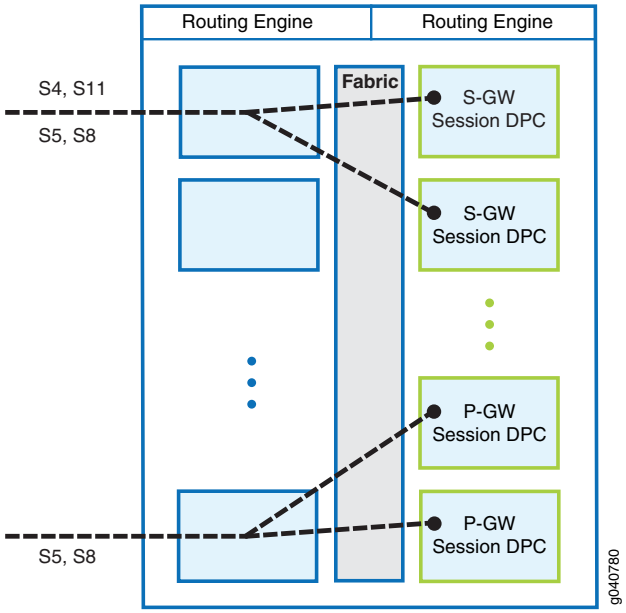



Figure 8 on page 25 shows how resource sharing and load balancing takes place in a collocated S-GW and P-GW configured on the broadband gateway. No matter how the broadband gateway is utilized, the chassis configuration for Modular Port Concentrators (MPCs), Dense Port Concentrators (DPCs), anchors, and session and services DPCs is the same. This topic concerns functional configuration of the installed and configured hardware.

The session DPCs are dedicated (and load balanced) for P-GW and S-GW functions. Resources are not shared between S-GW and P-GW session DPCs. The resources of each DPC are dedicated to either one function or the other.

NOTE: You can only configure a session DPC to support the S-GW or the P-GW function. A DPC cannot be configured as part of both at the same time. If you try to configure the chassis this way, the commit operation will fail.

You can configure the broadband gateway so that separate mobile subscribers see the gateway as one of the following:

- P-GW
- S-GW
- Collocated P-GW and S-GW

NOTE: You can also configure multiple collocated P-GWs and S-GWs on the same chassis.

You assign various mobile subscribers to their respective gateways, packet networks, and mobile services.

**Related Documentation**

- Overview of Broadband Gateway System Architecture on page 4
- Serving Gateways and the MobileNext Broadband Gateway Overview on page 21
- Overview of Collocated Gateways: Control Plane on page 27
- Overview of Collocated Gateways: User Plane on page 28
- Configuring an S-GW on a Broadband Gateway on page 29
- Configuring S-GW-Specific Profiles on page 31
- Configuring S-GW Traceoptions on page 32

## Overview of Collocated Gateways: Control Plane

You can configure the MobileNext Broadband Gateway as a collocated Serving Gateway (S-GW) and Packet Data Network Gateway (P-GW). GPRS Tunneling Protocol, control (GTP-C) packets pass through their respective session Dense Port Concentrators (DPCs).

**Figure 9: Collocated S-GW and P-GW Control Packet Flow**

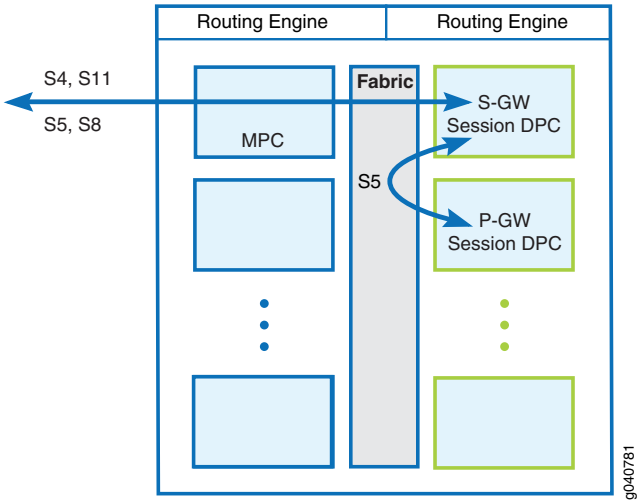



Figure 9 on page 27 shows the path of GTP-C packets through the broadband gateway when configured as a collocated S-GW and P-GW.

The Routing Engine(s) provide:

- Chassis management
- Storage of Charging Data Records (CDRs)
- A point for operations and management

The interface Modular Port Concentrators (MPCs) provide load balancing of the control plane packets and form a single network element.

The session DPCs constitute the mobility control plane and provide seamless 2G, 3G, or 4G subscriber management and multiple functions on the same card.

The control plane also handles all control functions such as GTP-C processing, charging using GTP-prime, Dynamic Host Configuration Protocol (DHCP) functions, and Authentication, Authorization, and Accounting (AAA) functions.

**Related Documentation**

- Overview of Broadband Gateway System Architecture on page 4
- Serving Gateways and the MobileNext Broadband Gateway Overview on page 21
- Overview of Standalone S-GW User Plane Packet Flow on page 24
- Overview of Collocated Gateways: User Plane on page 28

## Overview of Collocated Gateways: User Plane

You can configure the MobileNext Broadband Gateway as a collocated Serving Gateway (S-GW) and Packet Data Network Gateway (P-GW). All GPRS tunneling protocol (GTP) packets pass efficiently from input to output interface through their respective anchor Modular Port Concentrators (MPCs).

Figure 10: Collocated S-GW and P-GW User Packet Flow

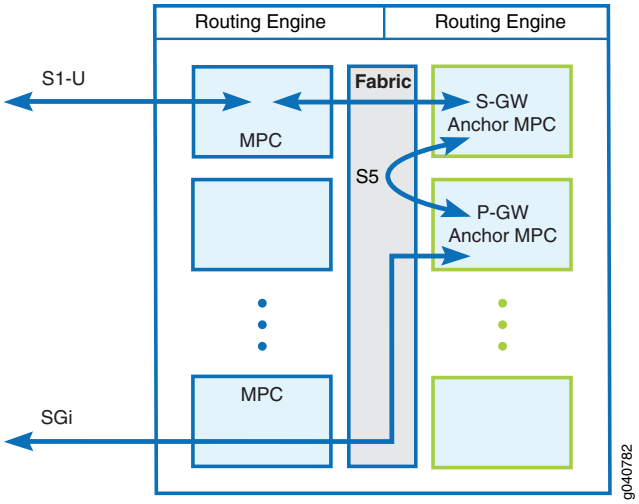



Figure 10 on page 28 shows a collocated P-GW and S-GW in the same broadband gateway. The usual path of user packets from eNodeB radio network (S1-U) to internal S5 interface to SGi interface is shown. Note that the user packet passes through the S-GW and P-GW anchor Modular Port Concentrators (MPCs) for a particular bearer, but the packets do not flow through a services Packet Forwarding Engine unless absolutely necessary.

For user packet flows, the anchor MPC provides:

- Line rate GTP packet processing
- Stitching together of packet streams and packet forwarding
- Extremely low latency
- Hardware-based quality of service (QoS)
- Traffic counters and charging information

When necessary, the services Packet Forwarding Engine provides the following for the user packet flow:

- IP Security (IPsec)
- Internet Key Exchange version 2 (IKEv2)
- Network Address Translation (NAT) and forwarding
- Deep Packet Inspection (DPI)

NOTE: **The broadband gateway can have other services PFEs that are not associated with the S-GW or P-GW.**

**Related Documentation**

- Overview of Broadband Gateway System Architecture on page 4
- Serving Gateways and the MobileNext Broadband Gateway Overview on page 21
- Overview of Standalone S-GW User Plane Packet Flow on page 24
- Overview of Collocated Gateways: Control Plane on page 27
- Configuring an S-GW on a Broadband Gateway on page 29
- Configuring S-GW-Specific Profiles on page 31
- Configuring S-GW Traceoptions on page 32

## Configuring an S-GW on a Broadband Gateway

The MobileNext Broadband Gateway establishes a context and framework for mobile operations under the unified edge. The basic mobile framework unit is the gateway, which can be used as a Serving Gateway (S-GW). The S-GW also has one or more home public land mobile networks (HPLMNs) associated with it.

Before you begin configuring an S-GW on the broadband gateway, you should have done the following:

- Configured access to the MobileNext Broadband Gateway

To establish the mobile context for the S-GW, you name the gateway, configure a list of HPLMNs, and set various other parameters. The HPLMNs consist of the mobile country code (MCC) and mobile network code (MNC).

To configure the gateway and related parameters:

1. Configure a name for the gateway.

   **[edit unified-edge gateways sgw ]**
   **user@host# set** *MGB-SGW1*

NOTE: You can include dashes or underscores, up to 63 characters, but many special characters are not allowed in the gateway name.

2. Configure a list of HPLMNs for the gateway.

```
[edit unified-edge gateways sgw MBG-SGW1]
user@host# set home-plmn mcc 001 mnc 01
```

NOTE: The MMC/MNC combination 00101 is reserved for test networks.

3. (Option) Set idle mode buffering expiration timer on the gateway.

```
[edit unified-edge gateways sgw MBG-SGW1]
user@host# set idle-mode-buffering expire-timer 60
```

NOTE: By default, idle mode buffering is enabled. You can set the expiration timer to any value from 30 through 300 seconds. If you disable idle-mode buffering, the 1G memory is used for subscriber management.

4. (Option) Enable remote delete on peer failure on the gateway.

```
[edit unified-edge gateways sgw MBG-SGW1 ]
user@host# set remote-delete-on-peer-fail
```

NOTE: By default, the S-GW will not delete peers on failure.

5. (Option) Configure the maximum bearers allowed on the gateway.

```
[edit unified-edge gateways sgw MBG-SGW1 ]
user@host# set maximum-bearers 500000
```

NOTE: By default, the S-GW supports 12,000,000 bearers. You can set any value from 100000 through 12000000.

6. (Option) Enable preemption on the gateway to allow some bearers to pre-emt others.

```
[edit unified-edge gateways sgw MBG-SGW1 ]
user@host# set preemption enable
```

NOTE: By default, the S-GW does not perform preemption.

**Related Documentation**

- Overview of Broadband Gateway System Architecture on page 4
- Serving Gateways and the MobileNext Broadband Gateway Overview on page 21
- Overview of Standalone S-GW User Plane Packet Flow on page 24

## Configuring S-GW-Specific Profiles

The MobileNext Broadband Gateway Serving Gateway (S-GW) uses two profile statements. This topic shows how to configure the profile statements that are unique to the S-GW configuration.

Before you begin configuring S-GW profiles on the broadband gateway, you should have done the following:

- Configured the chassis of the MobileNext Broadband Gateway
- Configured the interfaces used by the MobileNext Broadband Gateway
- Configured the IP reassembly parameters and local policy profiles referenced by the S-GW configuration

To establish the IP reassembly and local policy profiles for the S-GW, you apply the profile to the S-GW. The use of these profiles is optional.

To configure profiles for the S-GW:

1. Optionally, configure the S-GW IP reassembly profile.

   ```
   [edit unified-edge gateways sgw MBG-SGW1]
   user@host# set ip-reassembly-profile ip-reassembly--one
   ```

   NOTE: The IP reassembly parameters such as **timeout** are configure for the profile at the **[edit services ip-reassembly]** hierarchy level.

2. Optionally, configure the S-GW local policy profile.

   ```
   [edit unified-edge gateways sgw MBG-SGW1]
   user@host# set local-policy-profile local-profile-1
   ```

   NOTE: The local policy profile parameters must already be configured at the **[edit unified-edge]** hierarchy level. Only the **classifier-profile** and **resource-threshold-profiles** are supported on the S-GW.

**Related Documentation**

- Overview of Broadband Gateway System Architecture on page 4
- Serving Gateways and the MobileNext Broadband Gateway Overview on page 21
- Overview of Standalone S-GW User Plane Packet Flow on page 24

- Overview of Collocated Gateways: Control Plane on page 27
- Overview of Collocated Gateways: User Plane on page 28
- Configuring an S-GW on a Broadband Gateway on page 29
- Configuring S-GW Traceoptions on page 32


## Configuring S-GW Traceoptions

Serving Gateway (S-GW) tracing operations record detailed messages about the operation of high-level S-GW services on the MobileNext Broadband Gateway. You can trace various types of operations such as configuration events, connection admission control events, PFE manager events, and other information. You can specify which trace operations are logged by including specific tracing flags and levels.

Table 10 on page 32 describes the flags relating to the S-GW that you can include at the **[edit unified-edge gateways sgw *gateway-name* traceoptions flag]** hierarchy level.

### Table 10: S-GW Trace Flags

| Flag | Description |
|---|---|
| **all** | Trace everything. |
| **bulkjob** | Trace resources. |
| **config** | Trace configuration events. |
| **cos-cac** | Trace class-of-service and connection admission control events. |
| **ctxt** | Trace user equipment, packet data network, and bearer context events. |
| **fsm** | Trace finite state machine events. |
| **gtpu** | Trace GPRS tunneling protocol, user (GTP-U) protocol events. |
| **ha** | Trace high availability events. |
| **init** | Trace initialization events. |
| **pfem** | Trace Packet Forwarding Engine manager events. |
| **stats** | Trace statistic events. |
| **waitq** | Trace wait queue events. |

Table 11 on page 32 describes the levels you can include.

### Table 11: S-GW Trace Levels

| Level | Description |
|---|---|

Table 11: S-GW Trace Levels *(continued)*

| | |
|---|---|
| **all** | Match all levels. |
| **error** | Match error conditions. |
| **info** | Match informational messages. |
| **notice** | Match conditions that should be specially handled. |
| **verbose** | Match verbose messages. |
| **warning** | Match warning messages. |

To configure tracing options for S-GW operations:

1. Specify that you want to configure tracing options for S-GW operations.

   [edit unified-edge gateways sgw *MBG2* ]
   user@host# **edit traceoptions**

   NOTE: You can use the **no-remote-trace** statement at this level to disable remote tracing capabilities.

2. Configure the filename for the trace file.

   [edit unified-edge gateways sgw *MBG2* traceoptions]
   user@host# **set file *datapath-log***

3. (Optional) Configure the maximum size of each trace file.

   [edit unified-edge gateways sgw *MBG2* traceoptions]
   user@host# **set file size 100m**

   NOTE: When a trace file (for example, sgw-log) reaches its maximum size, it is renamed sgw-log.0, then sgw-log.1, and so on, until the maximum number of trace files is reached. The oldest archived file is then overwritten.

4. Configure the tracing flag.

   [edit unified-edge gateways sgw *MBG2* traceoptions]
   user@host# **set flag all**

   NOTE: You should use care when tracing all operations on a gateway. This can have a performance impact.

5. Configure the tracing level.

   [edit unified-edge gateways sgw *MBG2* traceoptions]
   user@host# **set level error**

6. View the trace file.

   **user@host# file show /var/log/sgw-log**

**Related Documentation**

- Overview of Broadband Gateway System Architecture on page 4
- Serving Gateways and the MobileNext Broadband Gateway Overview on page 21
- Overview of Standalone S-GW User Plane Packet Flow on page 24
- Overview of Collocated Gateways: Control Plane on page 27
- Overview of Collocated Gateways: User Plane on page 28
- Configuring an S-GW on a Broadband Gateway on page 29
- Configuring S-GW-Specific Profiles on page 31
- Configuring S-GW Data Path Traceoptions on page 97
- Configuring S-GW GTP Traceoptions on page 270
- Configuring S-GW Charging Traceoptions on page 292
- Configuring S-GW Local Persistent Storage Traceoptions on page 295

CHAPTER 2

# Network Architecture



## Overview of Mobile Networks

Mobile (cellular) networks have evolved rapidly as analog voice gave way to digital voice, and now routinely include data services and streaming digital video, all delivered to the mobile device or user equipment over an IP network. Although not directly part of 4G or the Long Term Evolution (LTE) of mobile networks, some background on the 3G mobile architecture and the 3G packet gateway, or gateway GPRS support node (GGSN), is necessary. This is because the Packet Data Network Gateway (P-GW) in the LTE architecture is still expected to internetwork and interoperate with 3G (and often even older) architectures and devices.

The major generations of mobile network architectures are:

- "1G"—The first generation; of course, no one called this type of mobile network "1G" because no one knew there would be subsequent generations. It supported analog voice bandwidths and did not support GPRS data.
- 2G—Once mobile networks proved popular, the next step digitized the radio signal (which added capacity and was spectrally more efficient) and added some rudimentary data capabilities through the Global System for Mobile Communications (GSM)

standard. Phone conversations were now digitally encrypted and text messaging (short message service, or SMS) began, although it would take years before most devices supported such messages. Enhanced mobile networks added digital services such as GPRS or Enhanced Data Rates for GSM Evolution (EDGE). Many mobile networks are still some form of 2G networks. The gateway GPRS support node (GGSN) was included in these advanced architectures.

- 3G—The many flavors of 2G networks led to the formation of the 3G Partnership Project (3GPP) to standardize the next generation of mobile networks. The universal mobile telecommunications system (UMTS) was standardized by the 3GPP and is widely used around the world. Today, many cell phones are GSM/UMTS hybrids. The latest UMTS release is called High Speed Packet Access (HSPA and HSPA+), offering higher bit rates.
- 4G and LTE—The fourth generation of mobile networks is defined by the International Telecommunication Union (ITU) as 4G. The 3GPP has also created a standard to provide a context for the "long-term evolution" of mobile networks (LTE) and LTE Advanced.

As time goes by, the designations 3G and 4G have become more marketing terms than architectural standards.

**Related Documentation**

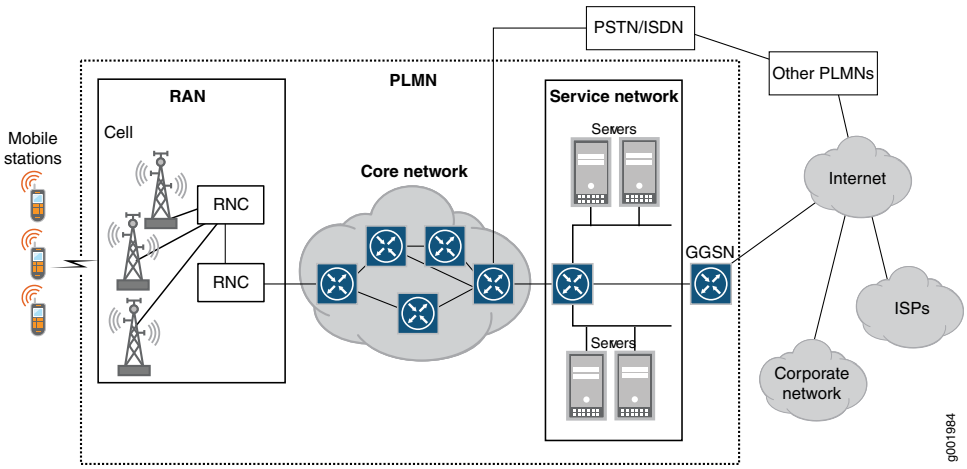
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 37
- Overview of GGSN and P-GW on page 38
- Overview of Packet Data Network Gateway Functions on page 40
- Overview of the Evolved Packet Core on page 42
- Overview of APNs on page 44
- Overview of PDP Contexts and Bearers on page 45
- Overview of GGSN and Broadband Gateway Deployment on page 47
- Overview of 4G/LTE and Broadband Gateway Deployment on page 48
- Overview of IPv6 and the Broadband Gateway on page 50
- Overview of IPv6 and the Broadband Gateway on page 50
- Serving Gateway and the S1 Interface Overview on page 51
- Serving Gateway and the S1 Interface Overview on page 51
- Service Areas and Tracking Areas Overview on page 52

## Overview of 3G Mobile Networks and the MobileNext Broadband Gateway

Third generation (3G) mobile networks define three components of the overall path from mobile station to IP network: the radio frequencies used, the air interface options used between the mobile device and base station, and the entire network architecture, including interfaces between components.

Figure 11 on page 37 shows the overall architecture of a 3G network. The MobileNext Broadband Gateway is configured as the gateway GPRS support node (GGSN) in this architecture.

### Figure 11: 3G Mobile Network Architecture




NOTE: The GGSN is not properly part of the 3G "service network."

There are three major parts to a 3G mobile network:

- A Radio Access Network (RAN). This is a hierarchical arrangement of cell towers and base stations. The base stations are called base transceiver stations (BTSs) or NobeBs in 3G. In some versions, there are also Radio Network Controllers (RNCs) that link to the BTSs to form a Radio Network Subsystem (RNS). A collection of RNSs using the Wideband CDMA (WCDMA) air interface option form the UMTS Terrestrial Radio Access Network (UTRAN). All of these are referred to as "network devices" in Figure 11 on page 37. The important point is that all handovers between cell towers are centrally controlled in the 3G network hierarchy.
- A core network (usually IP) tying the RAN to the 3G service network. The core network consists of all the switches, routers, and other network components required to transport mobile traffic.
- A service network reached through the core network. Some of the services reached (the servers in Figure 11 on page 37) are specific to the service provider, such as accounting information (current balance), short message service (SMS) texting, paging, and voice mail. Other services are reached through the GGSN (which is not properly

part of the 3G service network), such as the Internet, other Internet service providers (ISPs), or corporate network virtual private networks (VPNs). The MobileNext Broadband Gateway can be configured as a GGSN.

Together in 3G, the RAN, core network, and service network (and GGSN) make up the public land mobile network (PLMN). A PLMN ("land" network) is distinguished from a marine network.

**Related Documentation**

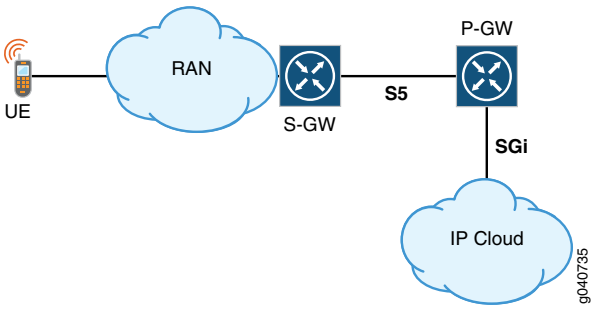
- Overview of Mobile Networks on page 35
- Overview of GGSN and P-GW on page 38
- Overview of Packet Data Network Gateway Functions on page 40
- Overview of the Evolved Packet Core on page 42
- Overview of APNs on page 44
- Overview of PDP Contexts and Bearers on page 45
- Overview of GGSN and Broadband Gateway Deployment on page 47
- Overview of 4G/LTE and Broadband Gateway Deployment on page 48
- Overview of IPv6 and the Broadband Gateway on page 50
- Overview of IPv6 and the Broadband Gateway on page 50
- Serving Gateway and the S1 Interface Overview on page 51
- Serving Gateway and the S1 Interface Overview on page 51
- Service Areas and Tracking Areas Overview on page 52

## Overview of GGSN and P-GW

The Juniper Networks MobileNext Broadband Gateway can act as a gateway GPRS support node (GGSN) in a 2G and 3G network architecture, a Packet Data Network Gateway (P-GW) in a 4G/LTE network architecture, or even both at the same time. When it comes to user traffic, the differences are mainly in the terms used to refer to the "mobile-facing" side of the gateway and not the IP data side.

Figure 12 on page 39 shows the major components and interfaces of a mobile network based on 4G/LTE standards.

Figure 12: 4G/LTE Mobile Network Basic Components




The major components are:

- User equipment (UE)—Often called the "mobile platform" in other standards. The user equipment can be a mobile smartphone, a "dongle" used to enable service on another device, a laptop, or even other compliant devices.
- RAN (Radio Access Network)—The RAN is called the universal terrestrial radio access network (UTRAN) in the 3G Universal Mobile Telecommunications System (UMTS) architecture (sometimes UTRAN is defined as UMTS Terrestrial Radio Access Network). In the LTE architecture, the RAN is the evolved UTRAN, or E-UTRAN.
- S-GW—In the LTE architecture, the node that handles all signaling messages to and from the user equipment is called the Serving Gateway (S-GW). (The SGSN in 3G networks is different from the S-GW in 4G networks.).
- P-GW—In 2G and 3G networks, the node that handled all user packets to and from the user equipment is called the GGSN. In the LTE architecture, this is the Packet Gateway (P-GW) or sometimes seen as the Packet Data Network Gateway (PDN-GW).
- IP Cloud– This is the Packet Data Network (PDN) in 2G and 3G and LTE. However, LTE adds another type of IP network, called IP Multimedia Services (IMS). IMS networks essentially handle VoIP calls to and from the user equipment.

From the GGSN/P-GW perspective, the major interfaces in the figure are:

- S5—In 4G/LTE, the S5 interface connects the P-GW to the mobile side of the network (for home users). In 3G, this is the Gn ("n" for network) interface.
- Gi/SGi—In 4G/LTE, the SGi interface connects the P-GW to the IP packet side of the network. In 3G, this is the Gi ("i" for Internet or IP network) interface.

**Related Documentation**


- Overview of Mobile Networks on page 35
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 37
- Overview of Packet Data Network Gateway Functions on page 40
- Overview of the Evolved Packet Core on page 42
- Overview of APNs on page 44
- Overview of PDP Contexts and Bearers on page 45
- Overview of GGSN and Broadband Gateway Deployment on page 47

- Overview of 4G/LTE and Broadband Gateway Deployment on page 48
- Overview of IPv6 and the Broadband Gateway on page 50
- Overview of IPv6 and the Broadband Gateway on page 50
- Serving Gateway and the S1 Interface Overview on page 51
- Serving Gateway and the S1 Interface Overview on page 51
- Service Areas and Tracking Areas Overview on page 52

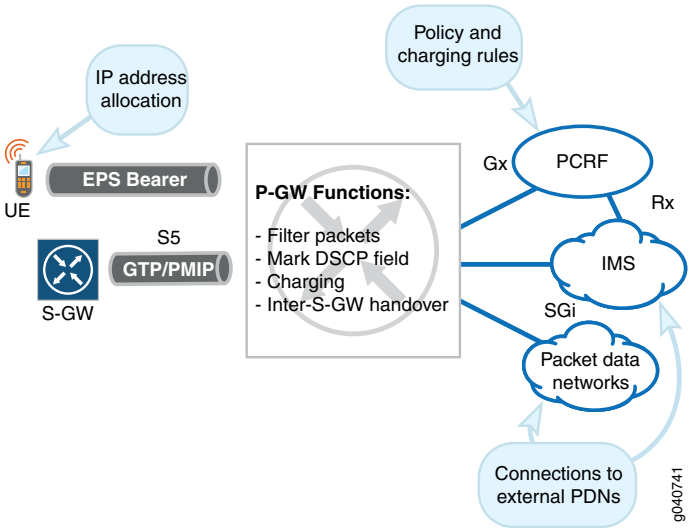

## Overview of Packet Data Network Gateway Functions

In a mobile network, a major function of the Packet Data Network Gateway (P-GW) is to allocate IP addresses to the user equipment during default bearer setup. The user equipment can still connect to multiple packet networks through multiple P-GWs, and also to older, non-3GPP-compliant IP networks.

NOTE: The MobileNext Broadband Gateway does not support interfaces to non-3GPP IP networks.

In the Long Term Evolution (LTE) architecture for the Evolved Packet Core (EPC), the P-GW acts as an anchor for user plane mobility. User traffic can be filtered at the P-GW for quality-of-service (QoS) differentiation among multiple packet flows. The P-GW collects charging information and forwards these Charging Data Records (CDRs) for processing.

Figure 13: Packet Data Network Gateway Functions



NOTE: The MobileNext Broadband Gateway does not initially support inter-S-GW handovers, connectivity to Non-3GPP IP networks, or direct rate enforcement.

The important interfaces on the P-GW shown in Figure 13 on page 40 are:

- EPS Bearer—This is the interface to the user equipment associated with the P-GW. It is a tunnel and used for IP address allocation and other purposes.
- Rx—Although not a direct P-GW interface, this interface is used for all kinds of unsolicited reporting between the policy and charging rules function (PCRF) and the IP Multimedia Subsystem (IMS) network. The IMS delivers services such as voice over IP (VoIP) to the user equipment. This interface uses the Diameter protocol over Steam Control Transport Protocol (SCTP) and TCP, and passes the PCRF permissions to the service network.
- SGi—This is the interface to the IMS and other internal and external Packet Data Networks (PDNs), where services are usually rendered. Examples are IMS for voice, Web portals, simple Internet access, and so on. All traffic is in the form of IP packets and flows.
- S5—This is the interface to the Serving Gateway (S-GW) associated with the P-GW. This interface supports the GPRS tunneling protocol (GTP) for the user plane.

**Related Documentation**

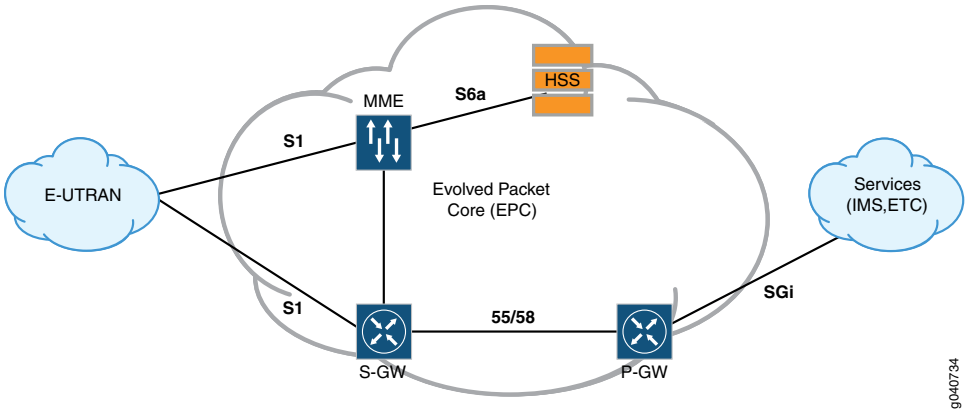
- Overview of Mobile Networks on page 35
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 37
- Overview of GGSN and P-GW on page 38
- Overview of the Evolved Packet Core on page 42
- Overview of APNs on page 44
- Overview of PDP Contexts and Bearers on page 45
- Overview of GGSN and Broadband Gateway Deployment on page 47
- Overview of 4G/LTE and Broadband Gateway Deployment on page 48
- Overview of IPv6 and the Broadband Gateway on page 50
- Overview of IPv6 and the Broadband Gateway on page 50
- Serving Gateway and the S1 Interface Overview on page 51
- Serving Gateway and the S1 Interface Overview on page 51
- Service Areas and Tracking Areas Overview on page 52

## Overview of the Evolved Packet Core

The Juniper Networks MobileNext Broadband Gateway, as a Packet Data Network Gateway (P-GW), is a key component of the Long Term Evolution (LTE) architecture's Evolved Packet Core (EPC). The P-GW faces the IP service and networks, and the Serving Gateway (S-GW) faces the radio network. Together, they provide the user plane from the IP packet network to the Radio Access Network (RAN). However, a few other EPC devices are necessary as well.

Figure 14 on page 42 shows the major components and interfaces of the EPC of a mobile network based on LTE standards. The user equipment can attach to only one Mobility Management Entity (MME) and S-GW at a time, but the user equipment can have connectivity to multiple P-GWs.

### Figure 14: Major Components of the Evolved Packet Core




The major components in the figure are:

- E-UTRAN—The Evolved Universal Terrestrial Radio Access Network (E-UTRAN) is the radio network portion of the LTE architecture.
- MME—The Mobility Management Entity (MME) is a device that manages and stores contexts for the user equipment. It generates temporary identifiers for the user equipment, manages the user equipment idle state (so the device is reachable from other devices and services), and distributes paging messages. The MME processes tracking area updates. The MME also manages security and controls bearers (the tunnels from user equipment to service).
- Serving Gateway (S-GW)—The S-GW handles user-plane handovers for mobility on the radio network side of the EPC and also coordinates P-GW attachments for users. When a user is roaming, at least the S-GW and MME are in the visited public land mobile network (VPLMN), whereas the P-GW can be in the HPLMN (the home routed case) or in the VPLMN (local breakout). In either case, the home network enforces subscriber authentication and polices.
- Packet Data Network Gateway (P-GW)—The P-GW forms the GTP tunnel endpoint for associated user equipment, allocates IP addresses, and provides support for charging and policy enforcement for service access.

- Home Subscriber Server (HSS)—The HSS is a user database that stores all subscription-related information about a user. This information supports call (connection) control and session management. The HSS function was performed by the Home Location Register (HLR) in older architectures.
- Service cloud—These are the services delivered by the Packet Data Network (PDN). This can be the global public Internet or an IP Multimedia Subsystem (IMS) network. IMS networks handle voice over IP (VoIP) calls to and from the user equipment.

The major interfaces in the figure are:

- S1—The S1 interface connects both the MME and S-GW to the mobile radio network. Technically, these are the S1-MME and S1-U interface, respectively.
- S5/S8—The S5 interface connects the P-GW with the local S-GW. When roaming, this is the S8 interface.
- S6a—The S6a interface connects the MME with the HSS. The interface is the same whether roaming or not.
- SGi (or Gi)—The SGi interface ("i" for Internet or IP) connects the P-GW to the Internet, IMS, or other IP network (such as a corporate intranet).

**Related Documentation**

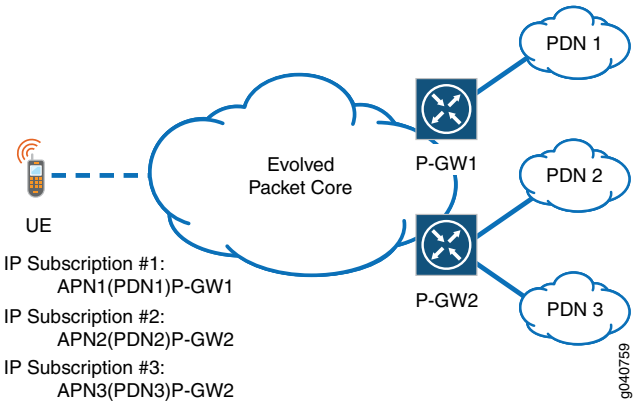

- Overview of Mobile Networks on page 35
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 37
- Overview of GGSN and P-GW on page 38
- Overview of Packet Data Network Gateway Functions on page 40
- Overview of APNs on page 44
- Overview of PDP Contexts and Bearers on page 45
- Overview of GGSN and Broadband Gateway Deployment on page 47
- Overview of 4G/LTE and Broadband Gateway Deployment on page 48
- Overview of IPv6 and the Broadband Gateway on page 50
- Overview of IPv6 and the Broadband Gateway on page 50
- Serving Gateway and the S1 Interface Overview on page 51
- Serving Gateway and the S1 Interface Overview on page 51
- Service Areas and Tracking Areas Overview on page 52

## Overview of APNs

In a mobile network, the access point name (APN) is the virtual private network (VPN) that connects the user equipment through the Packet Data Network Gateway (P-GW) to the Packet Data Network (PDN). User equipment can access many APNs, which are domain names and associated parameters, and one is the default APN. APNs are very similar to MPLS VPNs in landline networks.

In the Long Term Evolution (LTE) architecture for the Evolved Packet Core (EPC), the APN determines the P-GW the user equipment should use. The APN also defines the tunnel connecting the user equipment to a PDN such as the Internet. Each PDN that the user subscribes to has an APN and an associated P-GW, often called a "PDN subscription context." One context is the default APN, connecting to a PDN such as the Internet unless the user activates another APN. Figure 15 on page 44 shows the relationship among APNs, P-GWs, and packet networks.

### Figure 15: APNs and the P-GW




APNs are configured by network operators and hold many of the parameters that characterize the user session to the PDN. The APN determines authorization and address allocation methods, several types of timeouts, and various other parameters. It also determines the IP address pools to be used, the charging type (such as offline or online) to be used, and the policy model (for example, if a policy and charging rules function [PCRF] is used for policy control).

The P-GW can also use various rules to determine which APN the user equipment should use. This is called the APN service selection method. The APN in turn defines the service and the P-GW that the user equipment employs.

APNs often look like Internet domain names and have two parts:

- Network identifier—This defines the PDN the user connects to through a P-GW. This part of the APN is mandatory. It can be as simple as **internet** or have a more complicated structure such as **juniper.net**.
- Operator identifier—This defines the operator whose PDN the user connects to through a P-GW. This part of the APN is optional and is often omitted. If present, it consists of the operator's Mobile Country Code (MCC) and Mobile Network Code (MNC). A more

complex APN would be something like **internet.mnc012.mcc345.gprs** or, more realistically, **Web.omnitel.it**.

**Related Documentation**

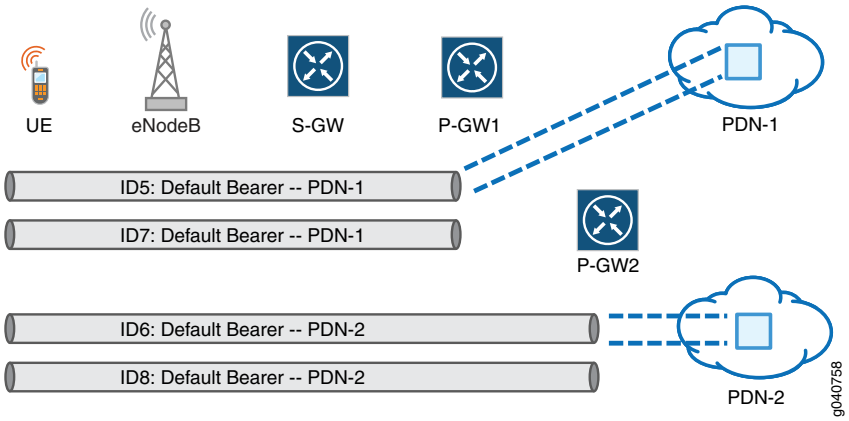
- Overview of Mobile Networks on page 35
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 37
- Overview of GGSN and P-GW on page 38
- Overview of Packet Data Network Gateway Functions on page 40
- Overview of the Evolved Packet Core on page 42
- Overview of PDP Contexts and Bearers on page 45
- Overview of GGSN and Broadband Gateway Deployment on page 47
- Overview of 4G/LTE and Broadband Gateway Deployment on page 48
- Overview of IPv6 and the Broadband Gateway on page 50
- Overview of IPv6 and the Broadband Gateway on page 50
- Serving Gateway and the S1 Interface Overview on page 51
- Serving Gateway and the S1 Interface Overview on page 51
- Service Areas and Tracking Areas Overview on page 52

## Overview of PDP Contexts and Bearers

In a mobile network using the Long Term Evolution (LTE) architecture, bearers are the tunnels used to connect the user equipment to Packet Data Networks (PDNs) such as the Internet. In practice, bearers are concatenated tunnels that connect the user equipment to the PDN through the Packet Data Network Gateway (P-GW).

In older architectures, bearers were known as packet data protocol (PDP) contexts. One PDP context connects to one PDN location by default (this was the default PDP context). Other PDP contexts (up to 11) could be established to or from the same user device. The maximum of 11 still holds in 4G/LTE networks. Figure 16 on page 46 shows the relationship between bearers and P-GWs.

Figure 16: Bearers, Gateways, and Packet Networks




NOTE: **The MobileNext Broadband Gateway initially supports only default bearers.**

In an LTE mobile network, one *default bearer* is established to a default P-GW whenever the user equipment device is activated (this means the user equipment is on and has performed authentication). There must be at least one default bearer to one default P-GW, but up to 11 other bearers to the same or other P-GWs can be active to a single user equipment device.

Bearers encapsulate user data with the GPRS tunneling protocol, user plane (GTP-U). The GTP-U information is in turn sent with UDP and inside IP packets.

Every user equipment device has an “always on” default bearer for each P-GW to which it connects. For example, if user equipment connects to the Internet through one P-GW and a corporate intranet through another P-GW, *two* default bearers will be active. In addition, the user equipment can establish other *dedicated bearers* to other PDNs, based on quality-of-service (QoS) requirements. For instance, viewing a streaming video over the Internet could be done over a dedicated bearer. Dedicated bearers can use a bandwidth guarantee (a guaranteed bit rate, or GBR) or the user equipment can establish a non-GBR bearer.

The bearer itself is a concatenated tunnel consisting of three portions (in a non-roaming situation), established in the following order:

- The S5 bearer—This tunnel connects the Serving Gateway (S-GW) to the P-GW. (The tunnel can extend from P-GW to PDN service network, but this is not considered here.)
- The S1 bearer—This tunnel connects the evolved NodeB (eNodeB or eNB) radio cell with the S-GW. Handover establishes a new S1 bearer for end-to-end connectivity.
- The radio bearer—This tunnel connects the user equipment to the eNodeB (eNB). This bearer follows the mobile user under the direction of the Mobile Management Entity (MME) as the radio network performs handovers when the user moves from one cell to another.

**Related Documentation**

- Overview of Mobile Networks on page 35
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 37
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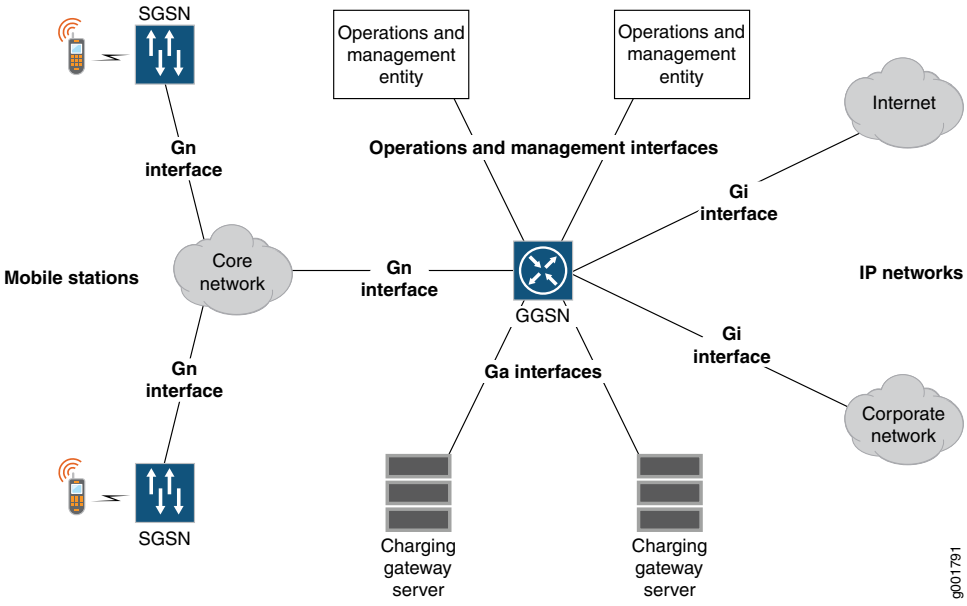
- Overview of Packet Data Network Gateway Functions on page 40
- Overview of the Evolved Packet Core on page 42
- Overview of APNs on page 44
- Overview of GGSN and Broadband Gateway Deployment on page 47
- Overview of 4G/LTE and Broadband Gateway Deployment on page 48
- Overview of IPv6 and the Broadband Gateway on page 50
- Overview of IPv6 and the Broadband Gateway on page 50
- Serving Gateway and the S1 Interface Overview on page 51
- Serving Gateway and the S1 Interface Overview on page 51
- Service Areas and Tracking Areas Overview on page 52

## Overview of GGSN and Broadband Gateway Deployment

The MobileNext Broadband Gateway can be configured and deployed as a gateway GPRS support node (GGSN) in a 3G network. The broadband gateway links the mobile network to various IP packet networks.

Figure 17 on page 47 shows how a GGSN (the broadband gateway) is deployed in a 3G network. The devices that the GGSN connects to are shown as well.

### Figure 17: The GGSN in a 3G Network



The GGSN supports three general types of conceptual 3G interfaces:

- Gn—These interfaces (“n” for network) connect to the mobile portion of the network, such as the Serving GPRS Support Node (SGSN). The SGSNs connect to the mobile stations themselves through the radio network.
- Gi—These interfaces (“i” for IP) connect to the IP packet portion of the network, such as the Internet or private corporate networks.
- Ga—These interfaces (“a” for administration) connect to the network management and operations portion of the network, such as the charging servers.

These defined conceptual interfaces can be implemented as almost any type of physical interface.

**Related Documentation**

- Overview of Mobile Networks on page 35
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 37
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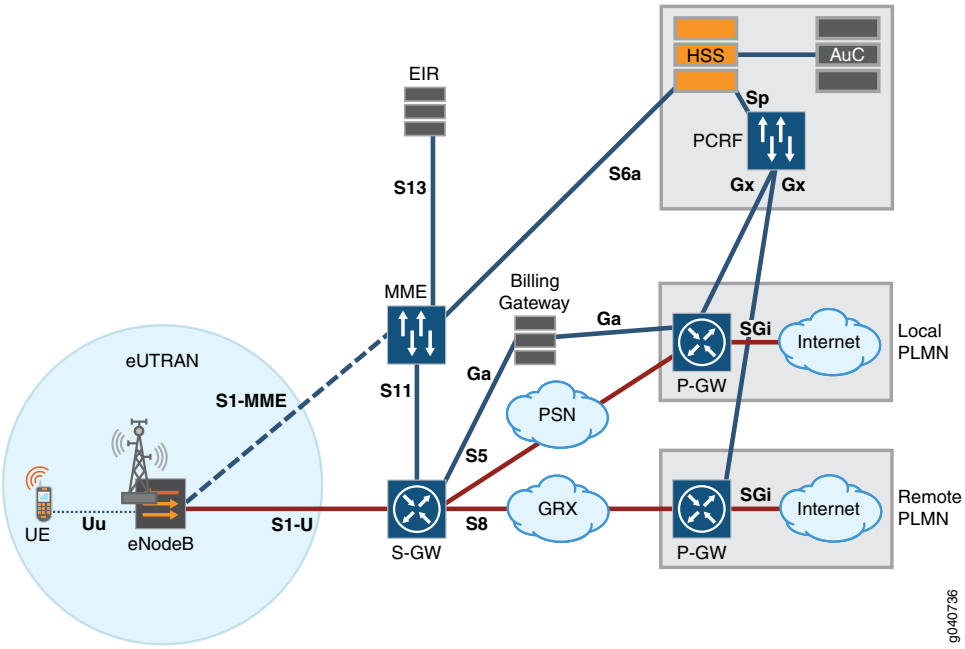
- Overview of Packet Data Network Gateway Functions on page 40
- Overview of the Evolved Packet Core on page 42
- Overview of APNs on page 44
- Overview of PDP Contexts and Bearers on page 45
- Overview of 4G/LTE and Broadband Gateway Deployment on page 48
- Overview of IPv6 and the Broadband Gateway on page 50
- Overview of IPv6 and the Broadband Gateway on page 50
- Serving Gateway and the S1 Interface Overview on page 51
- Serving Gateway and the S1 Interface Overview on page 51
- Service Areas and Tracking Areas Overview on page 52

## Overview of 4G/LTE and Broadband Gateway Deployment

It is one thing to look at network architectures with standardized interfaces and standardized functional components. It is another to consider a realistic deployment of network components that is realistic rather than theoretical.

Figure 18 on page 49 shows the major components and interfaces of a Long Term Evolution (LTE) mobile network from user equipment to network. Some of the major interfaces and components are labeled, but the emphasis here is on how these pieces are organized into a mobile network.

Figure 18: LTE Network Deployment Scenario




The major parts of the figure are:

- eUTRAN (E-UTRAN)—The Evolved Universal Terrestrial Radio Access Network (E-UTRAN) is the radio network portion of the LTE archteciture. The user equipment is part of the E-UTRAN, as is the radio tower, or evolved NodeB (eNodeB). The Uu interface connects the user equipment to the eNodeB, and the S1 interfaces connect to the Mobility Management Entity (MME) over the S1-MME interface (for the control plane) and the Serving Gateway (S-GW) over the S1-U (for user plane) interface.
- The HSS, AuC, and PCRF—The Home Subscriber Server (HSS), authentication center (AuC), and policy and charging rules function (PCRF) act together to make sure that the user equipment is authorized to access a particular service or network and that the user is billed correctly for the service. The Sp interface connects the HSS to the PCRF, and the S6a interface connects the HSS to the MME. The Gx interfaces connect to the P-GWs because P-GWs enforce the policy and charging rules through the P-GW's policy and charging enforcement function (PCEF).
- P-GW and Internet—A grouping of P-GWs and Packet Data Network (PDN) such as the Internet form a public land mobile network (PLMN). The UE can attach to a local or HPLMN through a P-GW or through a remote PLMN when roaming (if permitted). The S5 interface connects the local P-GW to its S-GW through a packet-switched network (PSN). For roaming, the S8 interface connects the remote P-GW to its S-GW through a GPRS Roaming Exchange (GRX). Note that billing, handled by the billing gateway, is a local PLMN function (settlements are used for roaming). The Ga interface connects the P-GW and S-GW to the billing gateway.
- S-GW, MME, EIR, and billing gateway—These components connect the radio network to the PLMN. The MME is a device that manages user equipment information. The equipment identification register (EIR), connected to the MME over the S13 interface,

ensures that the user equipment has not been reported stolen. The MME communicates with the S-GW over the S11 interface. User authentication relates to the subscriber profile in the HSS (reached over the S6a interface). Charging information is coordinated with the billing gateway.

Together, these components (and others) make up a complete mobile network.

**Related Documentation**

- Overview of Mobile Networks on page 35
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 37
- Overview of GGSN and P-GW on page 38
- Overview of Packet Data Network Gateway Functions on page 40
- Overview of the Evolved Packet Core on page 42
- Overview of APNs on page 44
- Overview of PDP Contexts and Bearers on page 45
- Overview of GGSN and Broadband Gateway Deployment on page 47
- Overview of IPv6 and the Broadband Gateway on page 50
- Serving Gateway and the S1 Interface Overview on page 51
- Serving Gateway and the S1 Interface Overview on page 51
- Service Areas and Tracking Areas Overview on page 52

## Overview of IPv6 and the Broadband Gateway

The Juniper Networks MobileNext Broadband Gateway, as a Packet Data Network Gateway (P-GW) or gateway GSN (GGSN), supports IPv6 as well as IPv4. However, there are some aspects of the IPv6 support that should be detailed.

When it comes to IPv6 support, in the current release, the MobileNext Broadband Gateway:

- Supports the allocation of IPv6 addresses to the mobile device.
- Does *not* support the use of an IPv6 network to connect the MobileNext Broadband Gateway to a Serving Gateway (S-GW) in a 4G/LTE or 3G architecture.

NOTE: **This means that the GGSN or P-GW uses IPv4 addresses as internal or loopback addresses.**

**Related Documentation**

- Overview of Mobile Networks on page 35
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 37
- Overview of GGSN and P-GW on page 38
- Overview of Packet Data Network Gateway Functions on page 40
- Overview of the Evolved Packet Core on page 42

- Overview of APNs on page 44
- Overview of PDP Contexts and Bearers on page 45
- Overview of GGSN and Broadband Gateway Deployment on page 47
- Overview of 4G/LTE and Broadband Gateway Deployment on page 48
- Serving Gateway and the S1 Interface Overview on page 51
- Serving Gateway and the S1 Interface Overview on page 51
- Service Areas and Tracking Areas Overview on page 52

## Serving Gateway and the S1 Interface Overview

One of the main roles of the Serving Gateway (S-GW), in contrast to the Packet Data Network Gateway (P-GW), is to coordinate hand-overs among e-UTRAN Node B (eNodeB) radio cells and even, when necessary, among S-GWs and Mobility Management Entities (MMEs) through the S1 interface. The S-GW handles the GPRS tunneling protocol, control (GTP-C) and GTP, user (GTP-U) packets.

Figure 19: S1 Interface Is Many-to-Many

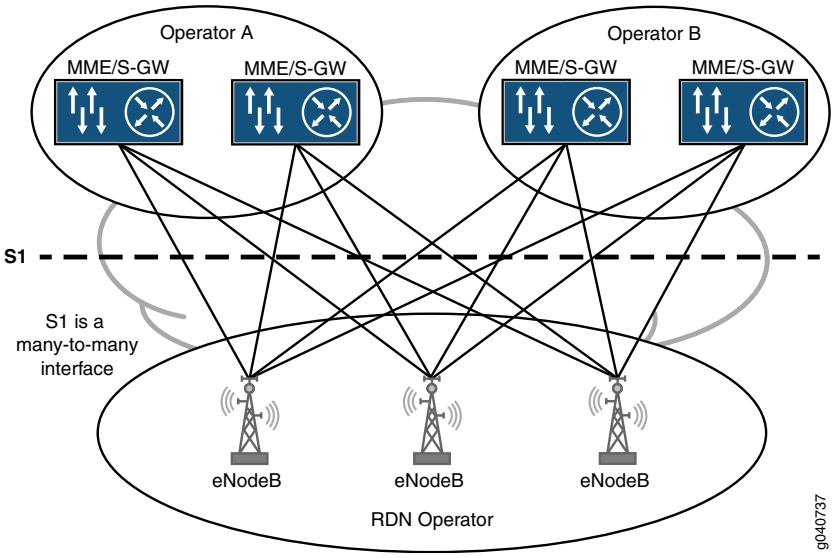



Figure 19 on page 51 shows that the S1 interface between eNodeBs and the MMEs and S-GWs is a many-to-many interface. The S1 interface supports redundancy and load sharing of these critical network nodes. Load sharing the MMEs allows the user equipment to operate in a given geographical area without changing the MME. S1 interface redundancy improves mobile network reliability. Finally, the many-to-many aspect of the S1 interface also allows the radio network to be shared by multiple operators.

**Related Documentation**

- Overview of Mobile Networks on page 35
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 37
- Overview of GGSN and P-GW on page 38

## Service Areas and Tracking Areas Overview

Groups of multiple Serving Gateways (S-GWs) and Mobility Management Entities (MMEs) can be established. The MME pool area and the S-GW service area do not have to coincide. In fact, they are often different because they are established independently. If the mobile user moves between tracking areas which belong to different MME pools or S-GW pool areas, then an MME or S-GW handover will occur. So even if an MME is not changing, the S-GW can change, and even if the S-GW is not changing, the MME can change. The handovers are in addition to the inter-S-GW and inter-MME handovers.

Figure 20: Tracking Areas and the S1 Interface

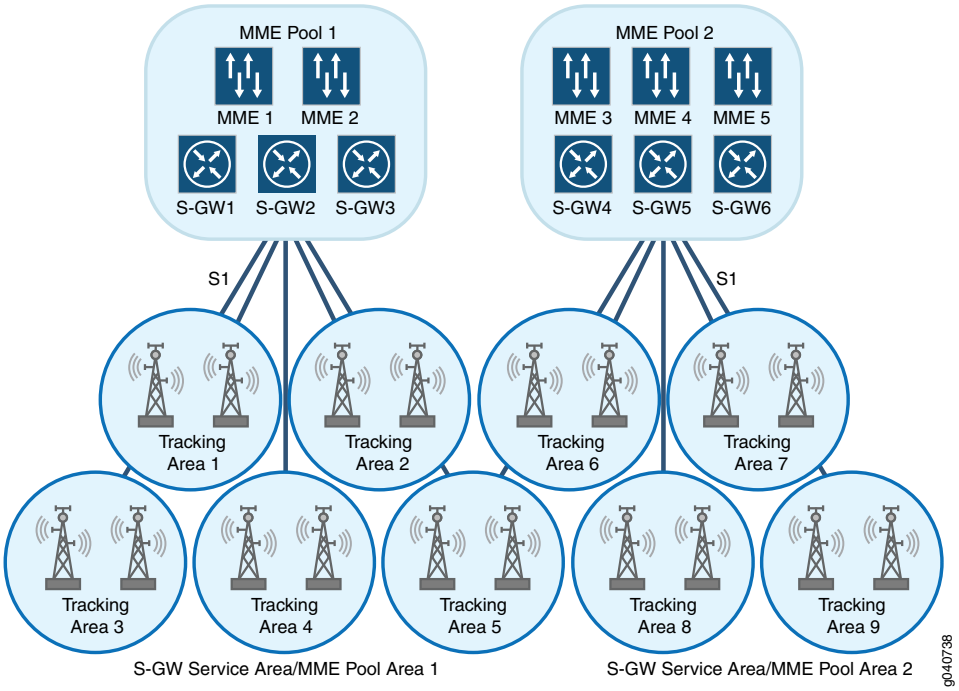


Figure 20 on page 52 shows the relationship between MME pools, S-GW serving areas (which coincide in this case), and enhanced Node B (eNodeB) tracking areas. A mobile user can move around inside the areas of this example network without changing either S-GW or MME. However, if the mobile user moves between the two tracking areas shown in the figure, both an MME hand-over and an S-GW hand-over will occur. Note the role of the S1 interface.

**Related Documentation**

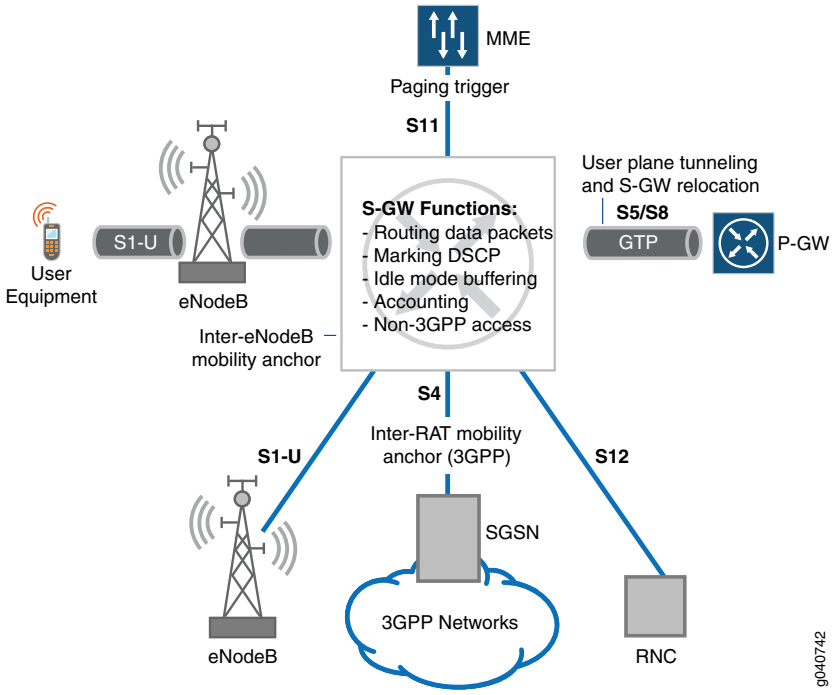
- Overview of Mobile Networks on page 35
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 37
- Overview of GGSN and P-GW on page 38
- Overview of Packet Data Network Gateway Functions on page 40
- Overview of the Evolved Packet Core on page 42
- Overview of APNs on page 44
- Overview of PDP Contexts and Bearers on page 45
- Overview of GGSN and Broadband Gateway Deployment on page 47
- Overview of 4G/LTE and Broadband Gateway Deployment on page 48
- Overview of IPv6 and the Broadband Gateway on page 50
- Serving Gateway and the S1 Interface Overview on page 51
- Serving Gateway Functions Overview on page 53

## Serving Gateway Functions Overview

You can configure the MobileNext Broadband Gateway as a Serving Gateway (S-GW) or Packet Data Network Gateway (P-GW), either as a standalone S-GW or standalone P-GW or collocated S-GW and P-GW.

Figure 21 on page 54 shows the broadband gateway configured as a standalone S-GW in a 4G mobile network. A mobile device only has one S-GW at any point in time.

Figure 21: S-GW Functions




The functions of the S-GW include:

- Establishing bearers based on the directives of the Mobility Management Entity (MME) over the S11 interface (bearers can be established on the S4 interface as well).
- Handling user data functions such as routing and forwarding packets to a P-GW over the S5 interface.
- Connecting the S-GW in a visitor public land mobile network (PLMN) with the P-GW in the home PLMN over the S8 interface.
- Connecting the S-GW with an enhanced Node B (eNodeB) radio network for user plane tunneling of GPRS tunneling protocol, user (GTP-U) packets and hand-overs through the S1-U interface.
- Anchoring for inter-3GPP mobility over the S4 interface connecting the S-GW with a 4G Serving GPRS Support Node (SSGN).
- Gathering accounting information per user and per bearer.

**Related Documentation**

- Overview of Mobile Networks on page 35
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 37
- Overview of GGSN and P-GW on page 38
- Overview of Packet Data Network Gateway Functions on page 40
- Overview of the Evolved Packet Core on page 42
- Overview of APNs on page 44

PART 2

# System Configuration

CHAPTER 3

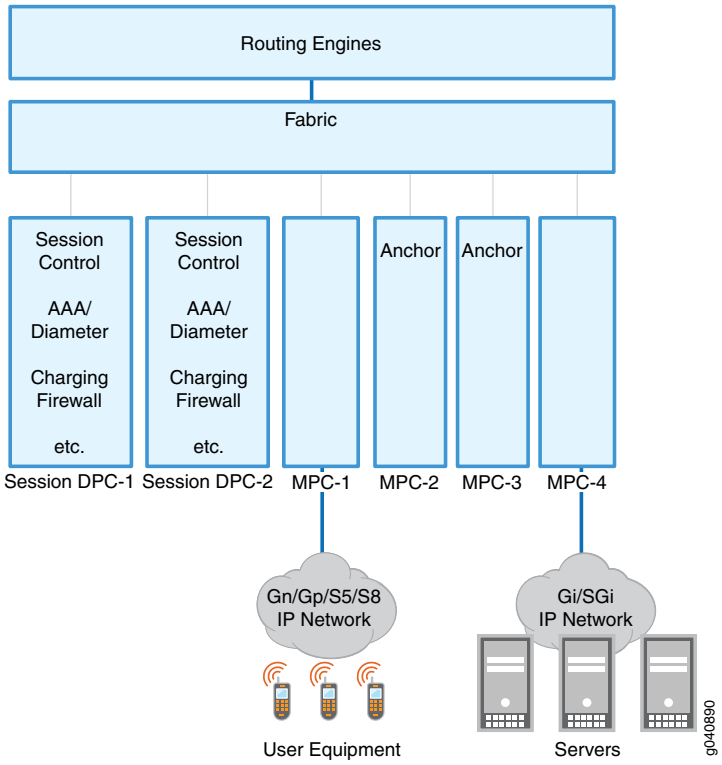
# Configuring Mobility on MX 3D Devices

## MobileNext Broadband Gateway Chassis Overview

You should begin MobileNext Broadband Gateway configuration with basic chassis configuration. Whether you used the broadband gateway as a gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW), determining the number of service and interface cards running the mobility package will make it easier to complete software configuration. Also, the relationship between physical devices such as Modular Port Concentrator (MPC) ports and logical constructs such as access point names (APNs) is not always obvious on the broadband gateway.

The broadband gateway consists of Routing Engines (we recommend two), session Dense Port Concentrators (DPCs) (we recommend two or more), and interface DPCs or MPCs (we recommend two or more). The interface DPCs and MPCs house the input and output Packet Forwarding Engine and physical interfaces. Other service DPCs and interface cards can be installed, but only the elements configured to run the mobility software package can be part of the broadband gateway function. In other words, some elements of the broadband gateway might not be involved in mobile packet flows at all, but these elements implement a provider edge (PE) router function, related network address translation (NAT) or IP security (IPsec) services, and so on. This topic describes only the mobile portion of the configuration. In Figure 22 on page 60, the session DPCs are shown on the left and the interface boards are shown as MPCs on the right.

Figure 22: Session DPCs and Interfaces on the Broadband Gateway



This chassis configuration overview covers:



## Session DPCs for Mobility

The session Dense Port Concentrators (DPCs) are multiservices DPCs that are used for mobile purposes. Incoming control packets from user equipment using the GPRS tunneling protocol, control (GTP-C) tunneling protocol are sent to one of these session DPCs. The selected session DPC becomes the *anchor* session DPC for this particular flow of packets. All control packets (GTP-C packets) relating to the session are sent to this anchor device.

The mobile services performed by the session DPC include:

- Session control
- Authentication, authorization, and accounting (AAA) checking using the Diameter protocol
- Charging parameters
- Admission control functions

## Overview of Mobility Interface Types

The interfaces that allow GPRS tunneling protocol, user plane (GTP-U) messages to flow into and out of the MobileNext Broadband Gateway can be Modular Port Concentrators (MPCs) or Dense Port Concentrators (DPCs). These mobile interfaces are configured as regular device interfaces; for example, **ge-0/1/2**, where the first position digit indicates the FPC slot (0), the second position digit indicates the PIC (Packet Forwarding Engine) position (1), and the last digit indicates the physical port (2). Some or all of the interface cards can be configured as anchor DPCs or MPCs. Once a session is established with the GTP-C control packets, all uplink and downlink user packets sent with the GTP-U tunnel protocol flow through the designated anchor device.

Examples of mobile interface DPCs or MPCs include:

- Mobile 60-Gigabit Ethernet Enhanced Queuing MPC
- Mobile 10-Gigabit Ethernet MPC with SFP+

The above list is for illustration only and is not an exclusive or comprehensive list.

**Related Documentation**


- Configuring Session DPCs for Mobility on page 62
- Configuring Interface DPCs or MPCs for User Mobility Traffic on page 64
- Understanding the MobileNext Broadband Gateway Anchors on page 65
- Configuring Anchor Session DPCs and PFEs on page 67
- Verifying the MobileNext Broadband Gateway Chassis Configuration on page 68
- Overview of Broadband Gateway System Architecture on page 4

## Configuring Session DPCs for Mobility

The MobileNext Broadband Gateway chassis has a number of open slots for cards (also called boards). Once installed, the cards must be configured. This topic describes the configuration process for the mobility FPC slots that hold session Dense Port Concentrators (DPCs).

Before you begin, you should have done the following:

- Installed the broadband gateway
- Installed the cards in the broadband gateway
- Decided which slots will be used for mobility

The session DPC cards of the broadband gateway must run in 64-bit mode. To simplify the configuration process, the broadband gateway software includes a predefined **mobility** group. This group includes all the parameters required for stable system operation. You apply the **mobility** group to the session DPC slots in the same way you apply any Junos OS group.

The predefined **mobility** group contains the following statements:

```
[edit groups]
mobility {
    chassis {
        fpc <*> {
            pic <*> {
                adaptive-services {
                    service-package {
                        extension-provider {
                            boot-os embedded-junos64;
                            control-cores 1;
                            data-pollers 1;
                            object-cache-size 512;
                            package jservices-mobile;
                            total-wired-memory 14336;
                            wired-max-processes 8;
                            wired-process-memory-size 1024;
                        }
                    }
                }
            }
        }
    }
}
```

NOTE: These parameters promote stable system operation. You should *not* change these parameters except under the advice of JTAC.

To configure a session DPC for mobility services, you load the default configuration file and merge it with your configuration, then apply the predefined **mobility** group to the session DPC. This task assumes that the session DPC is installed in chassis slot 1 and that both PICs are used for mobility services.

1. Load and merge the **mobility-defaults.conf** file.

   ```
   [edit]
   user@host# load merge /etc/config/mobility-defaults.conf
   ```

2. Configure the **mobility** group to run on both PICs in FPC 0.

   ```
   [edit chassis]
   user@host# set fpc 0 pic 0 apply-groups mobility
   user@host# set fpc 0 pic 1 apply-groups mobility
   ```

NOTE: You must include every services PIC configured with the jservices-mobile package at the **[edit unified-edge gateways ggsn-pgw *gateway-name* system anchor-spics]** hierarchy level on the broadband gateway. If you do not include the services PIC as an anchor, then the services PIC will not be used by the broadband gateway.

**Related Documentation**

- MobileNext Broadband Gateway Chassis Overview on page 60
- Configuring Interface DPCs or MPCs for User Mobility Traffic on page 64
- Understanding the MobileNext Broadband Gateway Anchors on page 65
- Configuring Anchor Session DPCs and PFEs on page 67
- Verifying the MobileNext Broadband Gateway Chassis Configuration on page 68
- Overview of Broadband Gateway System Architecture on page 4

## Configuring Interface DPCs or MPCs for User Mobility Traffic

The MobileNext Broadband Gateway chassis has a number of open slots for cards (also called boards). Once installed, the cards must be configured. This topic describes the configuration process for the interface Modular Port Concentrators (MPCs) or Dense Port Concentrators (DPCs) used for user mobile traffic.

Before you begin, you should have done the following:

- Installed the MobileNext Broadband Gateway
- Installed the cards of the broadband gateway
- Decided which DPCs or MPCs will be used for user mobility traffic

To configure an interface DPC or MPC for user mobility traffic, you configure the DPC or MPC to run the mobility forwarding package. You can configure this capability at the card (FPC) or Packet Forwarding Engine level. To configure the DPC or MPC:

1. Configure the forwarding package at the FPC level (so that all Packet Forwarding Engines understand what to do with mobility packets) by configuring the **mobility ggsn-pgw** (for a GGSN or P-GW) forwarding package or the **mobility sgw** (for a S-GW) forwarding package at the FPC level.

   ```
   [edit chassis]
   user@host# set fpc 0 forwarding-packages mobility ggsn-pgw
   user@host# set fpc 0 forwarding-packages mobility sgw
   ```

   In this example, all Packet Forwarding Engines on the DPC or MPC in FPC slot 0 are configured for mobility traffic.

2. Optionally, configure the forwarding package at the PIC level, so that *only* this PIC understands what to do with mobility packets by configuring the **mobility ggsn-pgw** or **mobility sgw** forwarding package at the PIC level:

```
[edit chassis]
user@host# set fpc 0 pfe 0 forwarding-packages mobility ggsn-pgw
user@host# set fpc 0 pfe 0 forwarding-packages mobility sgw
```

In this example, only Packet Forwarding Engine 0 on the DPC or MPC in FPC slot 0 is configured for mobility traffic.

NOTE: You must include every Packet Forwarding Engine configured with the **ggsn-pgw** forwarding package or **sgw** forwarding package at the **[edit unified-edge gateways ggsn-pgw** *gateway-name* **system anchor-pfes]** hierarchy level on the broadband gateway. If you do not specify the Packet Forwarding Engine as an anchor, then the Packet Forwarding Engine will not be used by the broadband gateway.

**Related Documentation**

- Configuring Session DPCs for Mobility on page 62
- Configuring Anchor Session DPCs and PFEs on page 67
- Verifying the MobileNext Broadband Gateway Chassis Configuration on page 68

## Understanding the MobileNext Broadband Gateway Anchors

The MobileNext Broadband Gateway processes GPRS tunneling protocol (GTP) and IP packets as they make their way upstream from mobile device to IP network or downstream from IP network to mobile device. Both control and data GTP packets are processed by an *anchor* session Dense Port Concentrator (DPC) or Packet Forwarding Engine (which are part of an interface DPC or Modular Port Concentrator [MPC] inside the broadband gateway). Anchor session PICs or Packet Forwarding Engines can be configured in a redundant manner to provide a failover data path in case of hardware problems.

Session DPCs use 1:1 redundancy and the component PICs (session DPCs have two PICs) are essentially configured in pairs to provide backup. For example, you can configure **ams0** so that PIC 1 in FPC slot 5 backs up PIC 1 in FPC slot 4. In other words, **mams-5/1/0** backs up **mams-4/1/0**. However, this configuration alone does not make **ams0** (or **mams-4/1/0**) an anchor session DPC. A separate configuration step is required for that. This “anchor or not” capability allows session DPCs to be used for services other than mobility.

The same logic applies to interface DPCs or MPCs (Packet Forwarding Engines), except that the redundancy is N:1. In this case, you can configure **apfe0** so that **pfe-9/0/0** is a warm standby for **pfe-7/0/0** and **pfe/8/0/0**. However, another configuration step is required to make the Packet Forwarding Engines in FPC slot 7 and 8 anchor Packet Forwarding Engines.

Figure 23: Upstream GTP-U Traffic

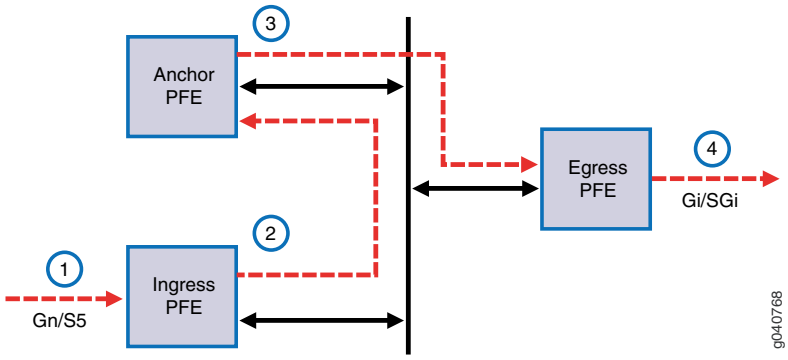



Figure 23 on page 66 shows how all GPRS tunneling protocol, user plane (GTP-U) traffic traverses an anchor Packet Forwarding Engine upstream from a Gn or S5 interface to a Gi or SGi interface:

- The arriving GTP-U packet is filtered by the outer IP address and associated with the proper Virtual Routing and Forwarding (VRF) table .
- The packet is sent to the anchor Packet Forwarding Engine associated with that group tunnel endpoint identifier (TEID) in the GTP header.
- The packet is decapsulated and the TEID is processed. The correct charging and quality-of-service (QoS) parameters are applied and the inner IP address is used for a route table lookup. The packet is sent to the correct egress interface.
- The packet is sent out on the correct Gi or SGi interface (other service functions such as network address translation [NAT] might be applied).

The downstream GTP-U packet process is a mirror of the upstream process.

Figure 24: Downstream GTP-U Traffic

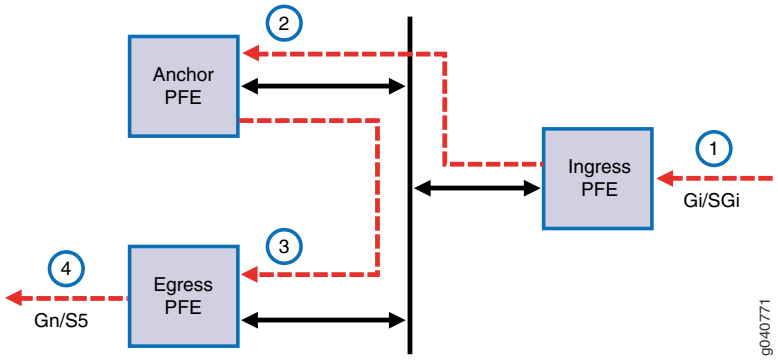


Figure 23 on page 66 shows how all GTP-U traffic traverses an anchor Packet Forwarding Engine downstream from a Gi or SGi interface to a Gn or S5 interface:

- The arriving IP packet is looked up in the route table associated with the proper virtual routing and forwarding table (VRF).
- The packet is sent to the anchor Packet Forwarding Engine associated with that route.
- The TEID associated with the packet is processed and the correct charging and QoS parameters are applied. The packet is then encapsulated with the TEID and the outer IP address. The outer IP address in the GTP header is used for a route lookup for the SGSN or S-GW. The packet is sent to the egress interface.
- The packet is sent from the correct Gn or S5 interface.

**Related Documentation**

- Configuring Anchor Session DPCs and PFEs on page 67
- MobileNext Broadband Gateway Chassis Overview on page 60
- Configuring Session DPCs for Mobility on page 62
- Configuring Interface DPCs or MPCs for User Mobility Traffic on page 64
- Verifying the MobileNext Broadband Gateway Chassis Configuration on page 68

## Configuring Anchor Session DPCs and PFEs

Even with redundancy configured, a separate step is required to make a session Dense Port Concentrator (DPC) or Packet Forwarding Engine (Packet Forwarding Engines are part of an interface DPC or Modular Port Concentrator [MPC]) a mobility anchor. An anchor acts as a tunnel endpoint for control and data GPRS tunneling protocol (GTP) packets.

Before you begin configuring anchors on a broadband gateway, you should have done the following:

- Configured the chassis of the MobileNext Broadband Gateway
- Configured the interfaces of the broadband gateway
- (Optional) Configured the general redundancy parameters for the broadband gateway

To determine the anchor session DPCs (PICs) and Packet Forwarding Engines, you configure the components as anchors.

To configure anchor session DPCs (PICs):

1. Add the PIC to the list of **anchor-spics**.

   [edit unified-edge gateway ggsn-pgw *MBG1* system]
   user@host# **set anchor-spics** interface *ams0*

NOTE: You can set the anchor PICs individually if you do not have redundancy configured. For example, you can use **ms-1/1/0** instead of **ams0**.

2. Add the Packet Forwarding Engine to the list of **anchor-pfes**.

   [edit unified-edge gateway ggsn-pgw *MBG1* system]
   user@host# **set anchor-pfes** interface *apfe0*
   user@host# **set anchor-pfes** interface *apfe1*

NOTE: You can set the anchor Packet Forwarding Engines individually if you do not have redundancy configured. For example, you can use **pfe-4/1/0** and **pfe-4/2/0**.

**Related Documentation**

- Configuring Session DPCs for Mobility on page 62
- Configuring Interface DPCs or MPCs for User Mobility Traffic on page 64
- Verifying the MobileNext Broadband Gateway Chassis Configuration on page 68

## Verifying the MobileNext Broadband Gateway Chassis Configuration

**Purpose** Display information about the MobileNext Broadband Gateway chassis configuration.

**Action**

- To display information about the chassis:

  user@host> **show chassis hardware**

**Related Documentation**

- Configuring Session DPCs for Mobility on page 62
- Configuring Interface DPCs or MPCs for User Mobility Traffic on page 64
- Configuring Anchor Session DPCs and PFEs on page 67

CHAPTER 4

# Configuring Redundancy on MX 3D Devices

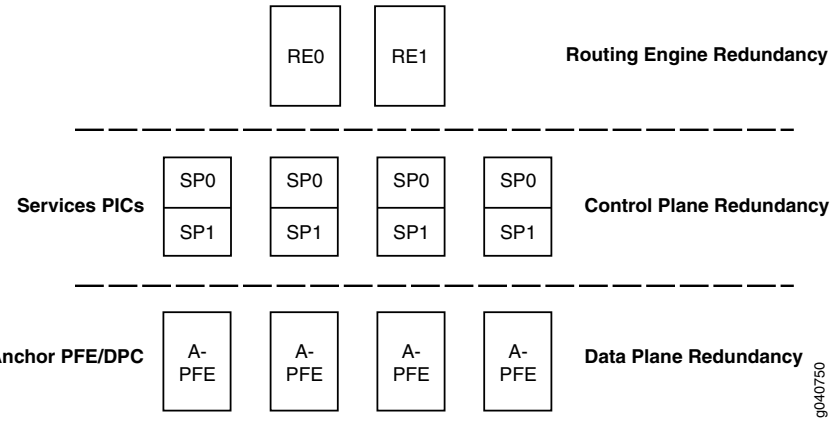
## Broadband Gateway Redundancy Overview

The MobileNext Broadband Gateway chassis contains Routing Engines, session Dense Port Concentrators (DPCs), and interface DPCs or Modular Port Concentrators (MPCs) (housing PFEs). Whether used as a GPRS gateway support node (GGSN) or Packet Data Network Gateway (P-GW), service and interface cards running the mobility package are configured to provide redundancy similar to that between the Routing Engines. However, different types of redundancy are used for the different levels of hardware used in the broadband gateway.

The broadband gateway consists of Routing Engines (we recommend two), sessions DPCs (we recommend two or more), and interface PFEs (we recommend two or more DPCs or MPCs). Other service DPCs and interface cards can be installed, but only the elements configured to run the mobility software package can be part of the broadband gateway function. In other words, some elements of the broadband gateway might not be involved in mobile packet flows, but they implement a provider edge (PE) router function, related network address translation (NAT) or IPsec services, and so on. This topic describes only the mobile redundancy portion of the configuration.

Figure 25 on page 70 shows that redundancy is available for the Routing Engines, session DPCs, and interface PFEs (housed in interface DPCs or MPCs). However, there are important differences in each type.

Figure 25: Redundancy Available on the Broadband Gateway




This redundancy configuration overview covers:

- Routing Engine Redundancy on page 70
- Session DPC Redundancy on page 71
- Interface Redundancy on page 72

### Routing Engine Redundancy

The Routing Engine is an Intel-based PCI platform that runs the Junos OS software on all product lines. The software processes that run on the Routing Engine oversee all of the functions that perform the mobility tasks running on the chassis. On the MobileNext

Broadband Gateway, there is 1:1 redundancy on the Routing Engines when two (the maximum) are installed.

When two Routing Engines are installed in the broadband gateway, both are powered on, but only one is active (the master). At boot time, both Routing Engines run an arbitration algorithm and elect one as master. The second Routing Engine is in standby mode and performs no functions. If the master Routing Engine fails, the standby unit takes over.

By default, the master Routing Engine is **RE0**. You can change the default master by including the appropriate **routing-engine** statement at the **[edit chassis redundancy** hierarchy level.

NOTE: **Although you can run the broadband gateway with only one Routing Engine, we do not recommend it.**

The Routing Engine components are hot-pluggable. Removal or failure of the standby does not affect the function of the broadband gateway.

However, if the master Routing Engine is removed from the chassis:

- If there is only one Routing Engine, then packet forwarding halts until the Routing Engine is reinstalled and functioning normally.
- If there are two Routing Engines, packet forwarding halts while the standby Routing Engine becomes the master.

You can configure the broadband gateway so that the standby Routing Engine automatically becomes the master if it stops receiving keepalive signals from the original master. You can also configure automatic switchover for other problems on the master, such as a hard disk failure. For more information, see the section about Routing Engine redundancy in the *Junos OS System Basics Configuration Guide*.

## Session DPC Redundancy

The MobileNext Broadband Gateway chassis includes a number of session DPCs (we recommend at least two). Each session DPC consists of two services PICs: services PIC 0 (SP0) and services PIC 1 (SP1). The session DPCs anchor control plane functions on the broadband gateway. The anchor DPC can be an individual PIC or aggregate.

The session DPCs support 1:1 redundancy. That is, the PICs in the session DPCs are configured in a one-to-one correspondence with their backups. So, for example, if the PIC0 in the session DPC in FPC slot 0 is paired with PIC0 in the session DPC in FPC slot 1, one PIC will back up the other PIC. These pairs are called aggregate multiservices (**ams-**) DPCs. However, the standby device is lost as a services DPC and all services are supplied by the active DPC PIC. In this case, the session DPC PICs associate **ams-0/0/0** and **ams-1/0/0**. You also configure units for AMS interfaces, and these are used for AAA and charging.

NOTE: You cannot configure a services PIC logical interface (ms-0/0/0.0, for example) if you also make the same logical interface part of an AMS group (ams-0/0/0.0 for example). This configuration will not commit.

You configure the AMS member interface that is the preferred backup.

### Interface Redundancy

The MobileNext Broadband Gateway chassis includes a number of interface Packet Forwarding Engines housed on DPCs or MPCs (we recommend at least two DPCs or MPCs). Each Packet Forwarding Engine consists of two or four Packet Forwarding Engines, depending on the DPC or MPC type. These are PFE0 and PFE1 (or optionally, PFE2 and PFE3). Some Packet Forwarding Engines are designated as anchor devices, and keep various parameters for the data plane traffic flow. Packets related to a particular flow must be processed by an anchor Packet Forwarding Engine. The anchor Packet Forwarding Engine can be a single Packet Forwarding Engine or an aggregate.

The interface Packet Forwarding Engines offer N:1 redundancy. That is, a configured number of interface Packet Forwarding Engines (N) are backed up by one warm standby Packet Forwarding Engine. Optionally, you can group Packet Forwarding Engines for redundancy purposes so that each member of the group shares the same fate.

To configure redundancy, you select a list of interface Packet Forwarding Engines to place on the active (primary) list. Then you select a different Packet Forwarding Engine to act as the secondary (standby) Packet Forwarding Engine for all Packet Forwarding Engines in the active group.

**Related Documentation**

- Configuring Session DPC Redundancy on page 72
- Configuring Interface Redundancy on page 74
- Understanding the Broadband Gateway Anchor Failover Behavior on page 76
- Example: Configuring Broadband Gateway Redundancy on page 78
- Configuring Anchor Session DPCs and PFEs on page 67

## Configuring Session DPC Redundancy

The MobileNext Broadband Gateway chassis includes a number of session Dense Port Concentrators (DPCs) (we recommend at least two). Each session DPC consists of two services PICs: services PIC 0 and services PIC 1. The session DPCs anchor control plane functions on the broadband gateway.

Before you begin configuring session DPC redundancy on a broadband gateway chassis, you should have done the following:

- Configured the chassis of the broadband gateway
- Configured the session DPCs

The session DPCs support 1:1 redundancy. That is, the PICs in the session DPCs are configured in a one-to-one correspondence with their backups. So, for example, if the PIC0 in the session DPC in FPC slot 0 is paired with PIC0 in the session DPC in FPC slot 1, one PIC will back up the other PIC. These pairs are called aggregate multiservices (**ams-**) PICs and the member interfaces are called members of the AMS (**mams-**). However, the standby device is lost as a services PIC and all services are supplied by the active PIC. In this case, the session PICs associate **mams-0/0/0** and **mams-1/0/0** as active and standby pairs. You also configure units for AMS interfaces, and these are used for AAA and charging.

NOTE: **You cannot configure a services PIC logical interface (ms-0/0/0.0, for example) if you also make the same logical interface part of an AMS (mams-0/0/0.0, for example). This configuration will not commit.**

You configure the AMS member interface that is the preferred backup. You can configure more than one AMS group, but each must have the 1:1 redundancy, of course.

To configure AMS group membership and redundancy actions for a pair of session DPCs on a broadband gateway:

1. Configure the session DPC redundancy pair called **ams0** so that PIC 1 of the session DPC in FPC slot 0 is backed-up by FPC slot 5 PIC 1.

   [edit interfaces]
   user@host# set *ams0* load-balancing-options member-interface *mams-4/1/0*
   user@host# set *ams0* load-balancing-options member-interface *mams-5/1/0*

   NOTE: **The load-balancing-options keyword has nothing to do with load balancing. When used for mobility, session DPCs automatically load-balance sessions.**

2. Configure the preferred backup for **ams0** so that FPC 4 PIC 1 is the active session DPC and FPC 5 PIC 1 is the backup.

   [edit interfaces]
   user@host# set *ams0* load-balancing-options high-availability-options many-to-one
   preferred-backup *mams-5/1/0*

   NOTE: **The many-to-one option is still used for 1:1 redundancy in this case.**

3. Configure the logical interfaces (units) for **ams0** so that **unit 0** and **unit 1** are available for AAA and charging uses.

   [edit interfaces]
   user@host# set *ams0 unit 1* family inet
   user@host# set *ams0 unit 2* family inet

   NOTE: **You do not have to assign an IP address.**

4. Configure the failure parameters for the members on **ams0**.

```
[edit interfaces]
user@host# set ams0 load-balancing-options member-interface-options
  redistribute-all-traffic enable-rejoin
```

NOTE: The **enable-rejoin** option is the only option currently supported for **redistribute-all-traffic**. If you configure the **redistribute-all-traffic** statement, you cannot also configure the **drop-member-traffic** statement on the same AMS group.

**Related Documentation**

- Broadband Gateway Redundancy Overview on page 70
- Configuring Interface Redundancy on page 74
- Understanding the Broadband Gateway Anchor Failover Behavior on page 76
- Example: Configuring Broadband Gateway Redundancy on page 78
- Configuring Anchor Session DPCs and PFEs on page 67

## Configuring Interface Redundancy

The MobileNext Broadband Gateway chassis includes a number of interface Packet Forwarding Engines housed on Dense Port Concentrators (DPCs) or Modular Port Concentrators (MPCs) (we recommend at least two DPCs or MPCs). Each Packet Forwarding Engine consists of two or four Packet Forwarding Engines, depending on the DPC or MPC type. These are PFE0 and PFE1 (or optionally, PFE2 and PFE3). Some Packet Forwarding Engines are designated as anchor devices, and keep various parameters for the data plane traffic flow. Packets related to a particular flow must be processed by an anchor Packet Forwarding Engine.

Before you begin configuring session DPC redundancy on a broadband gateway chassis, you should have done the following:

- Configured the chassis of the broadband gateway
- Configured the interface DPCs or MPCs used for mobility

The interface Packet Forwarding Engines offer N:1 redundancy. That is, a configured number of interface Packet Forwarding Engines (N) are backed up by one warm standby Packet Forwarding Engine. Optionally, you can group Packet Forwarding Engines for redundancy purposes so that each member of the group shares the same fate.

To configure interface redundancy for mobility, you select a list of interface Packet Forwarding Engines to place on the active (primary) list. Then you select a different Packet Forwarding Engine to act as the secondary (standby) Packet Forwarding Engine for all Packet Forwarding Engines in the active group.

To configure group membership and redundancy actions for a number of interface DPCs or MPCs on a broadband gateway:

1. Configure the interface DPC or MPC redundancy list called **apfe0** with all Packet Forwarding Engines in FPC slot 2 and 3 backed up in warm standby by the Packet Forwarding Engines in FPC slot 4.

   ```
   [edit interfaces]
   user@host# set apfe0 anchoring-options primary-list fpc-2
   user@host# set apfe0 anchoring-options primary-list fpc-3
   user@host# set apfe0 anchoring-options secondary fpc-4
   user@host# set apfe0 anchoring-options warm-standby
   ```

   NOTE: The **warm-standby** option is the only mode currently supported. In this configuration (for example) **ge-2/0/0** is backed up by **ge-4/0/0**, **ge-2/1/0** is backed up by **ge-4/1/0**, and so on.

2. Alternatively, configure the interface DPC or MPC redundancy list called **apfe1** with a Packet-Forwarding-Engine-by-Packet-Forwarding-Engine list of redundant components.

   ```
   [edit interfaces]
   user@host# set apfe1 anchoring-options primary-list pfe-7/0/0
   user@host# set apfe1 anchoring-options primary-list pfe-8/0/0
   user@host# set apfe1 anchoring-options secondary pfe-9/0/0
   user@host# set apfe1 anchoring-options warm-standby
   ```

   NOTE: The **warm-standby** option is the only mode currently supported. In this configuration (for example), **ge-7/0/0** or **ge-8/0/0** is backed up by **ge-9/0/0** in case of failure, but not **ge-7/1/0**.

3. Optionally, you can configure a group name for Packet-Forwarding-Engine-level redundancy **apfe1** and **apfe2** so that all components share the same fate.

   ```
   [edit interfaces]
   user@host# set apfe1 apfe-group-set apfe-group-name1
   user@host# set apfe1 anchoring-options primary-list pfe-7/0/0
   user@host# set apfe1 anchoring-options primary-list pfe-8/0/0
   user@host# set apfe1 anchoring-options secondary pfe-9/0/0
   user@host# set apfe1 anchoring-options warm-standby
   user@host# set apfe2 apfe-group-set apfe-group-name1
   user@host# set apfe2 anchoring-options primary-list pfe-7/2/0
   user@host# set apfe2 anchoring-options primary-list pfe-8/2/0
   user@host# set apfe2 anchoring-options secondary pfe-9/2/0
   user@host# set apfe2 anchoring-options warm-standby
   ```

**Related Documentation**

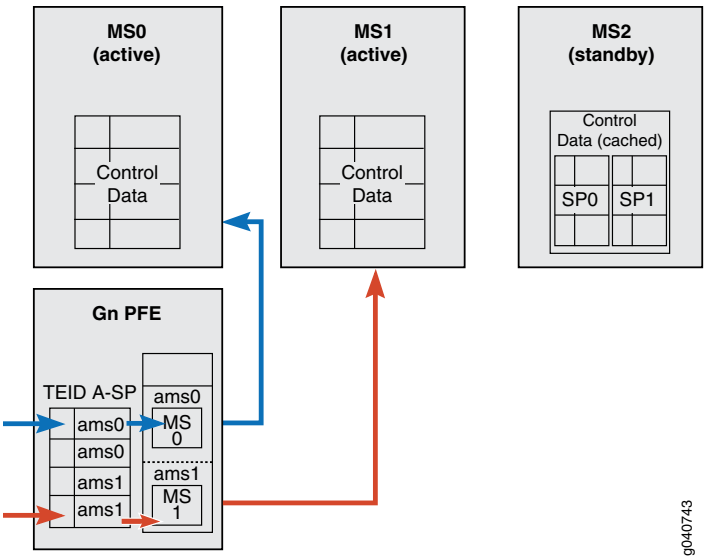
- Broadband Gateway Redundancy Overview on page 70
- Configuring Session DPC Redundancy on page 72
- Understanding the Broadband Gateway Anchor Failover Behavior on page 76

- Example: Configuring Broadband Gateway Redundancy on page 78
- Configuring Anchor Session DPCs and PFEs on page 67

## Understanding the Broadband Gateway Anchor Failover Behavior

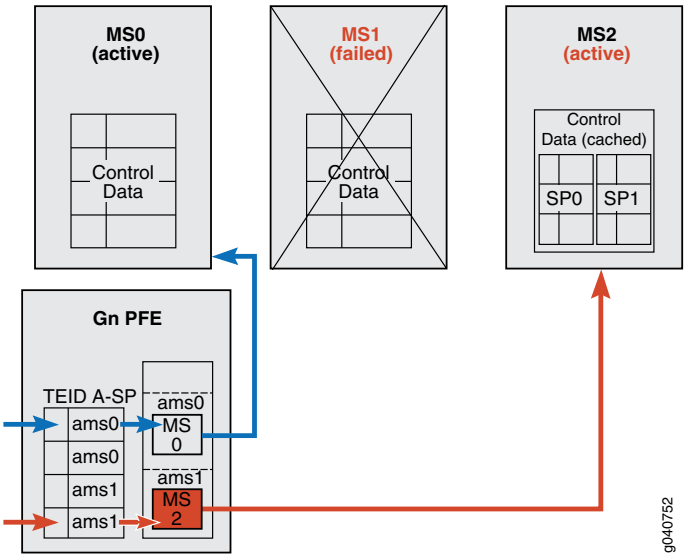
The MobileNext Broadband Gateway anchor session Dense Port Concentrators (DPCs) (housing PICs) and interface PFEs can be configured for redundancy. However, due to the different nature of the redundancy involved, 1:1 for anchor session PICs and N:1 for anchor interface PFEs, the failover behavior is slightly different.

Figure 26: Control Plane Anchor Operation Before Failure



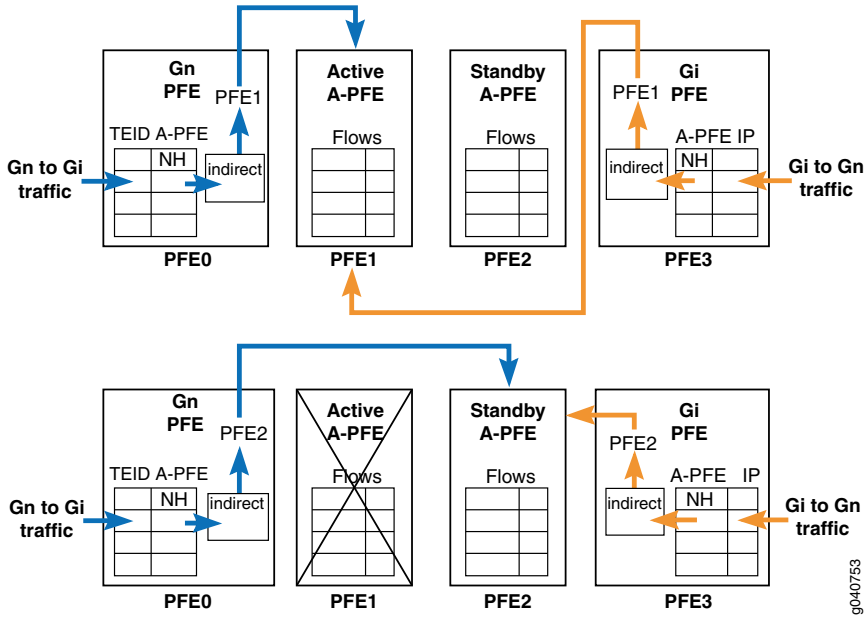

As shown in Figure 26 on page 76, you can configure session DPCs with or without backup. In this case, **MS0** has no backup redundancy, while both PICs (PIC0 and PIC1) on **MS1** are backed up 1:1 by standby **MS2**. When the anchor session DPC **MS1** fails, packets cannot be processed strictly by hardware data path until the transfer of control to the new anchor is complete. This is shown in Figure 27 on page 77. Note that **ams1** now points to **MS2**, the new active anchor.

Figure 27: Control Plane Anchor Operation After Failure




However, data plane packets feature N:1 anchor data path redundancy. Both pre- and post-failure Packet Forwarding Engine data paths are shown in Figure 28 on page 77. For clarity, only the active and standby Packet Forwarding Engines are shown.

Figure 28: Pre- and Post-Failure PFE Datapaths




During the transition on the ingress and egress interface Packet Forwarding Engines sending data plane packets from the failed **PFE1** to the new active **PFE2**, packets cannot be processed strictly by hardware data path until the transfer of control to the new anchor is complete.

**Related Documentation**

- Broadband Gateway Redundancy Overview on page 70
- Configuring Session DPC Redundancy on page 72
- Configuring Interface Redundancy on page 74
- Example: Configuring Broadband Gateway Redundancy on page 78
- Configuring Anchor Session DPCs and PFEs on page 67

## Example: Configuring Broadband Gateway Redundancy

This example shows how to configure redundancy for a MobileNext Broadband Gateway chassis containing session Dense Port Concentrators (DPCs) and interface DPCs and Module Port Concentrators (MPCs) (housing Packet Forwarding Engines). Routing Engine redundancy is not unique to mobility and is not discussed in this example. This topic describes only the unique mobile redundancy portion of the configuration.



### Requirements

This example uses the following hardware and software components:

- An MX chassis equipped with four session DPCs and three interface DPCs or MPCs.
- Junos OS Mobility package

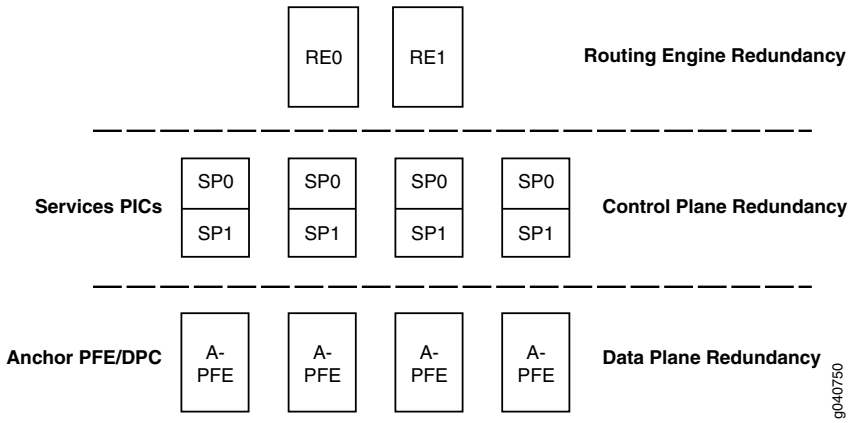
Before you begin:

- Install the chassis hardware.
- Configure the chassis.

### Overview

Figure 29 on page 79 shows a broadband gateway chassis with multiple Routing Engines (not discussed further in this example), session DPCs, and interfaces Packet Forwarding Engines (housed in DPCs or MPCs).

Figure 29: Redundancy Example for the Broadband Gateway




In this example, the chassis has session DPCs in Packet Forwarding Engines slots 4 and 5 featuring 1:1 redundancy. Group **ams0** will backup PIC **mams-4/1/0** with **mams-5/1/0** and redistribute all traffic with the rejoin option. Group **ams1** will back up PIC **mams-4/0/0** with **mams-5/0/0**. Both groups have two logical units for authentication, authorization, and accounting (AAA) and charging. The chassis also has interface DPCs or MPCs in Packet Forwarding Engines slots 7, 8, and 9, featuring N:1 redundancy, in this case, 2:1. This example backs up Packet Forwarding Engines **pfe-7/0/0** and **pfe-8/0/0** with warm standby **pfe-9/0/0**.

## Configuration

Redundancy for the above is configured by:

- Configuration on page 79

### Configuration

CLI Quick Configuration

```
[edit interfaces]
user@host# set ams0 load-balancing-options member-interface mams-4/1/0
user@host# set ams0 load-balancing-options member-interface mams-5/1/0
user@host# set ams0 load-balancing-options high-availability-options many-to-one
  preferred-backup mams-5/1/0
user@host# set ams0 load-balancing-options member-interface-options
  redistirbute-all-traffic enable-rejoin
user@host# set ams0  unit 1 family inet
user@host# set ams0  unit 2 family inet
user@host# set ams1 load-balancing-options member-interface mams-4/0/0
user@host# set ams1 load-balancing-options member-interface mams-5/0/0
user@host# set ams1 load-balancing-options high-availability-options many-to-one
  preferred-backup mams-5/0/0
user@host# set ams1  unit 1 family inet
user@host# set ams1  unit 2 family inet

user@host#set apfe0 anchoring-options primary-list pfe-7/0/0
user@host#set apfe0 anchoring-options primary-list pfe-8/0/0
user@host#set apfe0 anchoring-options secomdary pfe-9/0/0 warm-standby
```

**Results** From configuration mode, confirm your configuration by entering the **show interfaces** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

For brevity, this **show** command output includes only the configuration statements that are relevant to this example.

```
ams0 {
  load-balancing-options {
    member-interface mams-4/1/0;
    member-interface mams-5/1/0;
    member-failure–options {
      redistribute-all-traffic {
        enable-rejoin;
      }
    }
    high-availability-options {
      many-to-one {
        preferred-backup mams-5/1/0;
      }
    }
  }
  unit 1 {
    family inet;
  }
  unit 2 {
    family inet;
  }
}
ams1 {
  load-balancing-options {
    member-interface mams-4/0/0;
    member-interface mams-5/0/0;
    member-failure–options {
      drop-member-traffic {
        rejoin-timeout 10000;
      }
    }
    high-availability-options {
      many-to-one {
        preferred-backup mams-5/1/0;
      }
    }
  }
  unit 1 {
    family inet;
  }
  unit 2 {
    family inet;
  }
}

apfe0 {
  anchoring-options {
    primary-list {
```

```
        fpc-7/0/0;
        fpc-8/0/0;
      }
      secondary pfe-9/0/0;
      warm-standby;
    }
  }
```

If you are done configuring the device, enter **commit** from configuration mode.

## Verification

### Verifying Redundancy

**Purpose** Verify that redundancy is enabled or not.

**Action** From operational mode, enter the **show unified-edge ggsn-pgw interfaces redundancy** command.

NOTE: To view failover statistics, enter the **show unified-edge ggsn-pgw exception-handling statistics failover** command.

**Meaning** The output shows the redundancy parameters or failover statistics configured on the gateway

**Related Documentation**

- Broadband Gateway Redundancy Overview on page 70
- Configuring Session DPC Redundancy on page 72
- Configuring Interface Redundancy on page 74
- Understanding the Broadband Gateway Anchor Failover Behavior on page 76
- Configuring Anchor Session DPCs and PFEs on page 67

CHAPTER 5

# Configuring Mobile Edge Exception Handling



## IP Packet Fragment Reassembly Overview

You can configure the MobileNext Broadband Gateway so that reassembly of fragmented IP packets is carried out inline (on the Packet Forwarding Engine) instead of performing IP reassembly on the services PIC. By default, IP reassembly is carried out on the services PIC. You can change the default behavior of the gateway, whether the gateway is configured as a Serving Gateway (S-GW), Packet Data Network Gateway (P-GW), or Gateway GPRS Support Node (GGSN). Although Serving Gateway Support Nodes (SGSNs) also reassemble IP packets, the broadband gateway cannot be configured as an SGSN.

Fragmentation of IP packets for transmission and the need to reassemble the IP packets at a destination is a feature of how Layer 2 (the frame layer) and Layer 3 (the packet layer) operate. That is, the maximum size of a frame, set by the Maximum Transmission Unit (MTU) value, and the maximum size of a packet are determined independently. It is usually the case that the packet size can far exceed the MTU size. If the packet size (data plus IP and other headers) exceeds the allowable frame size (usually set by the transport medium limits), the packet must be fragmented at the sender and split across

multiple frames for transmission. Frames are always processed immediately, as they arrive (if error-free), but packet fragments cannot be processed until the whole packet has been reassembled. Each packet fragment inside a frame series, except the last, has the more fragments (MF) IP header bit set, indicating that this packet is part of a whole. The last packet fragment inside a frame does not have this MF bit set and therefore ends the fragment sequence. Once all of the fragments of a packet have arrived, the entire packet can be reassembled.

When memory buffers for networking were limited, heavy intervals of arriving fragmented traffic easily resulted in performance degradations or even complete "reassembly deadlock," with buffers occupied only with fragments and no room for any arriving fragment that might complete a packet. In some cases, a packet fragment was discarded only to find that the newly arrived frame would have completed the packet just thrown away. It is clear that efficient reassembly is important for network throughput, scalability, and graceful response to congestion.

In some cases, you can avoid the need to fragment packets on a mobile network by adjusting the MTU size to account for added headers such as GTP. However, in cases where multiple vendors are used or organization lines are crossed, this MTU adjustment might not be possible and IP fragmentation is unavoidable.

Figure 30: Fragmented Packet Requiring Reassembly

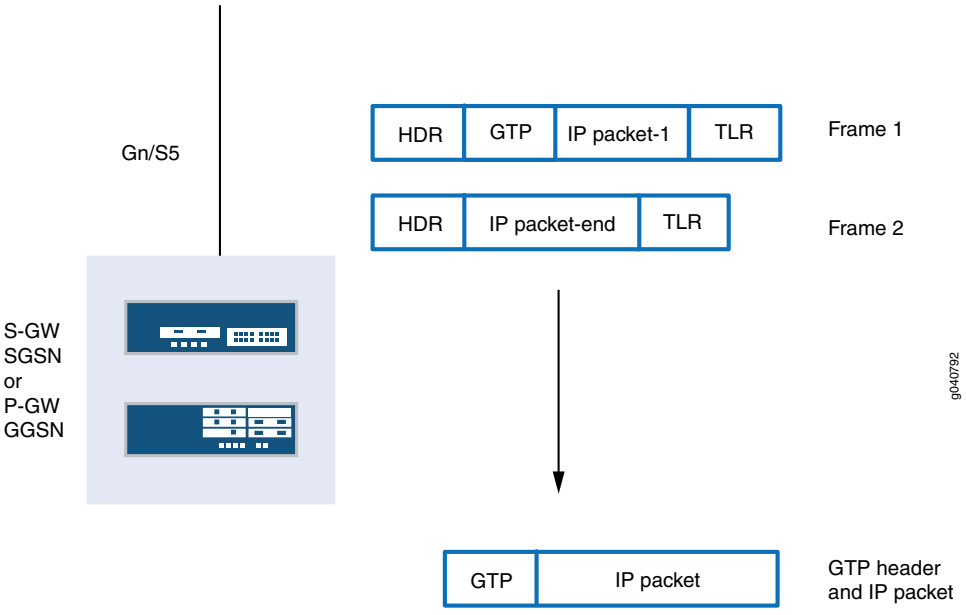
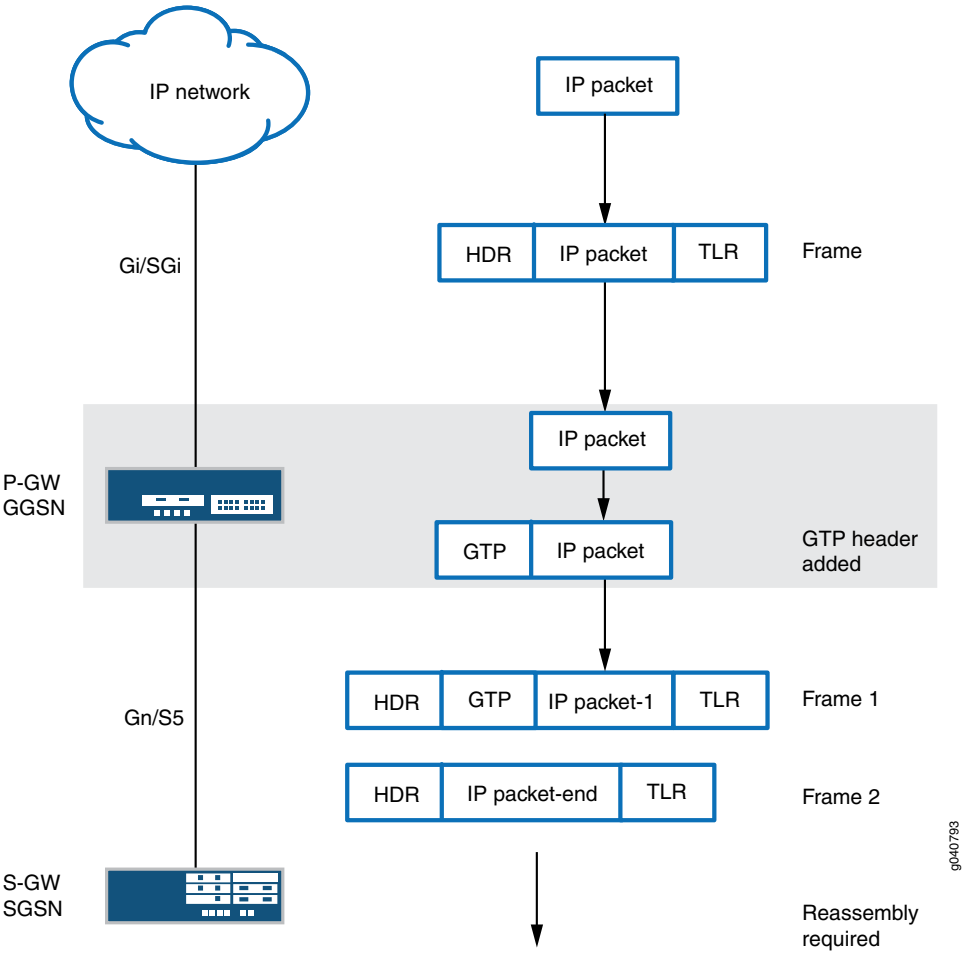



Figure 30 on page 84 shows a fragmented packet containing user data that requires reassembly on arrival on the Gn or S5 interface. On the broadband gateway, IP reassembly is carried out on the services PIC by default. This example configures the broadband gateway to perform IP reassembly of fragmented IP packets inline, on the Packet Forwarding Engine. However, inline reassembly requires the dedication of Packet Forwarding Engine resources for reassembly, which means these resources cannot be used for their usual purposes. You should consider potential trade-offs before changing the default behavior of the gateway.

As shown in Figure 31 on page 85, a framed downstream packet from an IP network to mobile device is sent over a Gi (3G) or SGi (LTE) interface to a GGSN or P-GW. At the GGSN/P-GW, the frame is processed and a 20-byte GTP-U header added to the packet. If the packets use the most common MTU size of 1500 bytes ( for network efficiency), the added 20 bytes put the data unit over the allowable 1500 byte limit (1500 + 20 = 1520). To send the 1520-byte packet over the Gn (3G) or S5 (LTE) interface to the SSGN or S-GW, the GGSN or P-GW must fragment the packet and distribute the 1520 bytes into two frames (1500 bytes and 20 bytes). Because frames are processed immediately as they arrive (there is no such thing as “frame 1 of 2”), the first packet fragment must be kept until the second frame is processed and completes the packet. Then the whole packet with GTP-U header can be processed, routed, and sent on downstream. This requires the SSGN or S-GW to perform the reassembly of the IP packet. Heavy traffic loads create an environment that forces the receiving node to keep track of and process many fragments at the same time.

Figure 31: A GTP-U Header Causing Fragmentation




Inline IP reassembly is enabled at the gateway level (for example, the entire P-GW or S-GW). Fragments for all IP addresses associated with the broadband gateway configured for inline reassembly are stored and reassembled on the interface on which it arrives. Enabling inline IP reassembly affects all fragments for that gateway. The mobility line

cards reserve 2 MB of memory for storing fragments (non-mobility line cards reserve 8 MB).

NOTE: Inline IP reassembly of fragments arriving on different Packet Forwarding Engine complexes are not supported. These IP fragments are stored, but cannot be reassembled and eventually timeout and are dropped. The inline reassembly timeout parameter is 20 milliseconds (ms) and cannot be changed. The timeout values from 2 (default) through 60 seconds and is set for an IP reassembly profile at the **[edit services ip-reassembly *ip-reassembly-profile-name* inline-services]** hierarchy level apply to IP reassembly on the services PIC only.

Inline IP reassembly does not preclude the use of the services PIC. The packet forwarding engine could run out of memory to store fragments. In that case, new fragments that arrive are directed to the services PIC (if available) as a kind of "backup." Once the packet forwarding engine memory usage recovers, all fragments are again processed inline in the packet forwarding engine.

It should be noted that other scenarios involve IP fragment reassembly. For instance, IPsec is often used to encapsulate GTP packets on the S1-U interfaces from eNodeB to S-GW. IPsec encapsulation often causes packet fragmentation as well.

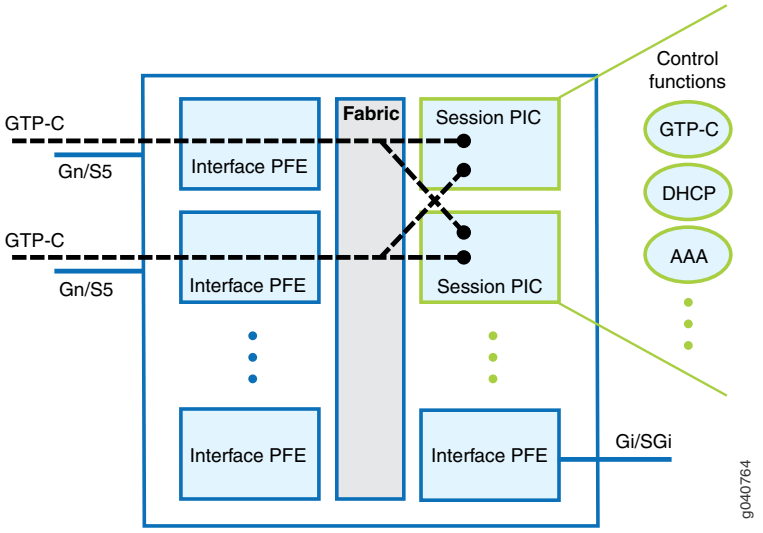
**Related Documentation**

- Configuring IP Inline Reassembly on page 90
- Example: Configuring Inline IP Packet Fragment Reassembly on page 99
- Understanding the Broadband Gateway Exception Handling on page 87

## Understanding the Broadband Gateway Exception Handling

The MobileNext Broadband Gateway processes GPRS tunneling protocol (GTP) and IP packets as they make their way from an input interface to an output interface, upstream from mobile device to IP network or downstream from IP network to mobile device. Usually, the packet processing is handled at the hardware level. However, certain *exception* packets follow a path through software.

Figure 32: GTP-C Handling




As shown in Figure 32 on page 87, control plane packets such as session creation requests arriving on a Gn or S5 (or S8) interface are sent to an anchor session Dense Port Concentrator (DPC) for processing. The session DPC load-balances and selects anchor interface DPCs or Modular Port Concentrators (MPCs) (housing the Packet Forwarding Engines) for the user session, and all subsequent data packets for that session flow through the anchor Packet Forwarding Engine. Mid-session control packets, such as those changing session parameters due to mobility, are still sent to the anchor session DPC and associated PICs. In general, upstream and downstream data flows are handled directly by the anchor Packet Forwarding Engine.

There are four exceptions to the general rule that user packets flow only through Packet Forwarding Engine hardware:

- Anchor Packet Forwarding Engine failovers (N:1)
- Reassembly of GTP-U and mobility control plane (for instance, authentication, authorization, and accounting [AAA]) fragments
- IPv6 router advertisements and router solicitation packet handling
- GTP-U error indication generation

Only IP fragment reassembly and IPv6 router advertisements have parameters you can configure on the broadband gateway. (Anchor Packet Forwarding Engine configuration

is part of the basic chassis configuration and aggregated Packet Forwarding Engines for failover are part of redundancy configuration).

**Related Documentation**

- Understanding GTP-U Error Exception Handling on page 88
- Understanding Broadband Gateway IP Fragment Handling on page 89
- Configuring Fragment Reassembly Parameters on page 91
- Understanding IPv6 Protocol Parameters on page 92
- Configuring IPv6 Protocol Parameters on page 93
- Configuring Exception Handling Traceoptions on page 95
- Configuring S-GW Data Path Traceoptions on page 97
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105
- Configuring IP Inline Reassembly on page 90
- IP Packet Fragment Reassembly Overview on page 83

## Understanding GTP-U Error Exception Handling

The MobileNext Broadband Gateway processes GPRS tunneling protocol, user plane (GTP-U) packets with errors in a distinctly different way from non-errored packets, and treats two type of errors differently.

The broadband gateway generates error indications based on two major GTP-U Tunnel Endpoint Identifier (TEID) errors:

- Invalid group TEID
- Invalid TEID

The broadband gateway assigns a TEID to all GTP packets and uses the TEID to associate all traffic belonging to the same tunnel and map one section of a tunnel to another. In addition, TEIDs can be grouped so that all sessions (contexts or bearers) can share the same group TEID for charging or other purposes.

The GTP-U error indication can be caused by an invalid individual or group TEID. In both cases, the session DPC sends the error indication back to the source.

The rate of GTP-U error indications is throttled at all steps to prevent storms of invalid TEID messages.

**Related Documentation**

- Understanding the Broadband Gateway Exception Handling on page 87
- Understanding Broadband Gateway IP Fragment Handling on page 89
- Configuring Fragment Reassembly Parameters on page 91
- Understanding IPv6 Protocol Parameters on page 92
- Configuring IPv6 Protocol Parameters on page 93
- Configuring Exception Handling Traceoptions on page 95

- Configuring S-GW Data Path Traceoptions on page 97
- Configuring IP Inline Reassembly on page 90
- IP Packet Fragment Reassembly Overview on page 83
- Example: Configuring Inline IP Packet Fragment Reassembly on page 99
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105

## Understanding Broadband Gateway IP Fragment Handling

The MobileNext Broadband Gateway handles IP packet fragments differently than packets containing a single segment or datagram.

It is most efficient to process GPRS tunneling protocol (GTP) and IP packets immediately, as they arrive at the broadband gateway. Typically, a hardware data path is used to transfer packets to and from the anchor session Dense Port Concentrator (DPC) (for the control plane) or the interface Packet Forwarding Engine (for the data plane). However, fragmented packets require complete reassembly before processing can begin, because upper layer (Layer 4 and above) information will be missing in all but the first fragment. You can control many of the parameters associated with the fragment reassembly process.

You can configure the time interval that the anchor session DPCs wait for fragments to arrive. You can also configure the maximum number of packets that can be waiting for fragments. Both of these methods prevent the session DPCs from waiting for fragments that might never arrive.

**Related Documentation**

- Understanding the Broadband Gateway Exception Handling on page 87
- Understanding GTP-U Error Exception Handling on page 88
- Configuring Fragment Reassembly Parameters on page 91
- Understanding IPv6 Protocol Parameters on page 92
- Configuring IPv6 Protocol Parameters on page 93
- Configuring Exception Handling Traceoptions on page 95
- Configuring S-GW Data Path Traceoptions on page 97
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105

## Configuring IP Inline Reassembly

This procedure shows how to configure the MobileNext Broadband Gateway so that reassembly of fragmented IP packets is carried out inline (on the Packet Forwarding Engine) instead of performing IP reassembly on the services PIC. By default, IP reassembly is carried out on the services PIC. By default, IP reassembly is carried out on the services PIC. This example changes the default behavior of the gateway, whether the gateway is configured as a Serving Gateway (S-GW), Packet Data Network Gateway (P-GW), or Gateway GPRS Support Node (GGSN). Although Serving Gateway Support Nodes (SGSNs) also reassemble IP packets, the broadband gateway cannot be configured as an SGSN.

Before you configure inline IP reassembly, be sure you have:

- Configured the broadband gateway correctly.
- Configured a valid MTU size and GTP-U parameters.

To configure inline IP reassembly, perform these tasks:

1. [edit unified-edge gateways ggsn-pgw *gateway-name* inline-services]
   [edit unified-edge gateways sgw *gateway-name* inline-services]
   user@host# **set ip-reassembly**

**Related Documentation**

- IP Packet Fragment Reassembly Overview on page 83
- Example: Configuring Inline IP Packet Fragment Reassembly on page 99
- Understanding the Broadband Gateway Exception Handling on page 87
- Understanding GTP-U Error Exception Handling on page 88
- Understanding Broadband Gateway IP Fragment Handling on page 89
- Understanding IPv6 Protocol Parameters on page 92
- Configuring IPv6 Protocol Parameters on page 93
- Configuring Exception Handling Traceoptions on page 95
- Configuring S-GW Data Path Traceoptions on page 97
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105

## Configuring Fragment Reassembly Parameters

On the MobileNext Broadband Gateway, anchor session Dense Port Concentrators (DPCs) reassemble arriving user plane packet fragment in order to have complete Layer 4 and above information. To prevent reassembly deadlock while waiting for fragments that never arrive, you can configure the time interval that the anchor session DPCs wait for fragments to arrive and the maximum number of packets that can be waiting for fragments.

Before you begin configuring reassembly parameters on the broadband gateway, you should have done the following:

- Configured the chassis of the broadband gateway
- Configured the interfaces of the broadband gateway
- Configured the general redundancy parameters for the broadband gateway

To determine the fragment reassembly behavior, you configure the timeout and maximum packets pending fragment parameters. You can group these parameters into an IP reassembly profile. More than one IP reassembly profile can be configured and applied to a particular gateway.

To configure the reassembly parameters:

1. Configure a value for the **timeout** in the reassembly profile.

   [edit services ip-reassembly profile *reassembly-profile-one* ]
   user@host# **set timeout** *4*

   NOTE: You can set the timeout value from 2 through 60 seconds. The default value is 4 seconds.

2. Configure a value for the **max-reassembly-pending-packets** in the reassembly profile.

   [edit services ip-reassembly profle *reassembly-profile-one* ]
   user@host# **set max-reassembly-pending-packets** *1000*

   NOTE: You can set the maximum packets pending reassembly value from 100 through 100,000 packets. The default value is 1000 packets.

3. Configure the broadband gateway to use the IP reassembly profile.

   [edit unified-edge gateways ggsn-pgw *MBG1* ]
   user@host# **set ip-reassembly-profile** *reassembly-profile-one*

   NOTE: You can configure multiple IP reassembly profiles, but apply only one to a particular broadband gateway. You can also apply the profile to a S–GW configuration.

Related Documentation

- IP Packet Fragment Reassembly Overview on page 83
- Understanding the Broadband Gateway Exception Handling on page 87
- Understanding GTP-U Error Exception Handling on page 88
- Understanding Broadband Gateway IP Fragment Handling on page 89
- Understanding IPv6 Protocol Parameters on page 92
- Configuring IPv6 Protocol Parameters on page 93
- Configuring Exception Handling Traceoptions on page 95
- Configuring S-GW Data Path Traceoptions on page 97
- Example: Configuring Inline IP Packet Fragment Reassembly on page 99
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105

## Understanding IPv6 Protocol Parameters

The MobileNext Broadband Gateway supports a series of parameters relating to IPv6 router advertisement.

Some of the most important pieces of IPv6 are built into the way the IPv6 protocol handles routers (or, in this case, the broadband gateway). Instead of requiring the user to configure a default router address, as typical in IPv4 configuration, IPv6 lets routers advertise their presence to other devices on the subnet. This allows hosts to choose the router that is most natural for the application.

You can configure several parameters for a gateway that determine how the IPv6 router protocols operate:

- hop limit—The number of hops used in the router advertisements. A value of zero means routers will not readvertise router availability.
- maximum advertisement interval—The maximum interval the router can wait before sending a router advertisement.
- minimum advertisement interval—The minimum interval the router can wait before sending a router advertisement.
- maximum initial advertisement interval—The maximum interval the router can wait between initial router advertisements.
- maximum initial advertisements—The maximum number of initial router advertisements.
- reachable time—The value used in the reachable time field of the router advertisements.
- router lifetime—The value used in the router lifetime field of the router advertisements.
- retransmission timer—The value used in the retransmit timer field of the router advertisements.

Related Documentation

- IP Packet Fragment Reassembly Overview on page 83

## Configuring IPv6 Protocol Parameters

You can configure several parameters for the MobileNext Broadband Gateway that determine how the IPv6 router protocols operate:

Before you begin configuring IPv6 protocol parameters on the broadband gateway, you should have done the following:

- Configured the chassis of the broadband gateway
- Configured the interfaces of the broadband gateway
- Configured the general parameters for the broadband gateway

To determine the IPv6 router protocol behavior, you configure a series of related timers and parameters used in the IPv6 header fields at the **[edit ggsn-pgw *ggsn-pgw-name* ipv6-router-advertisement]** hierarchy level. The parameters apply to a particular gateway.

To configure the IPv6 router protocol parameters:

1. Configure the **current-hop-limit**.

   [edit unified-edge gateways ggsn-pgw *MBG1* ipv6-router-advertisement]
   user@host# **set current-hop-limit** *0*

   NOTE: You can configure a value from 0 through 3 hops. The default is 0.

2. Configure the **maximum-advertisement-interval**.

   [edit unified-edge gateways ggsn-pgw *MBG1* ipv6-router-advertisement]
   user@host# **set maximum-advertisement-interval** *21600*

   NOTE: You can configure a value from 5400 through 21,600 seconds. The default is 21,600 seconds.

3. Configure the **maximum-initial-advertisement-interval**.

```
[edit unified-edge gateways ggsn-pgw MBG1 ipv6-router-advertisement]
user@host# set maximum-initial-advertisement-interval 10
```

NOTE: You can configure a value from 10 through 16 seconds. The default is 10 seconds.

4. Configure the **maximum-initial-advertisements**.

```
[edit ggsn-pgw bb-gw-one ipv6-router-advertisement]
user@host# set maximum-initial-advertisements 10
```

NOTE: You can configure a value from 2 through 5. The default is 3.

5. Configure the **minimum-advertisement-interval**.

```
[edit unified-edge gateways ggsn-pgw MBG1 ipv6-router-advertisement]
user@host# set minimum-advertisement-interval 16200
```

NOTE: You can configure a value from 3600 through 16200 seconds. The default is 16200 seconds.

6. Configure the **reachable-time**.

```
[edit unified-edge gateways ggsn-pgw MBG1 ipv6-router-advertisement]
user@host# set reachable-time 0
```

NOTE: You can configure a value from 0 through 3600000 milliseconds. The default is 0 milliseconds.

7. Configure the **retransmission-timer**.

```
[edit unified-edge gateways ggsn-pgw MBG1 ipv6-router-advertisement]
user@host# set retransmission-timer 0
```

NOTE: You can configure a value in milliseconds. There is no default.

8. Configure the **router-lifetime**.

```
[edit unified-edge gateways ggsn-pgw MBG1 ipv6-router-advertisement]
user@host# set router-lifetime 21840
```

NOTE: You can configure a value from 5400 through 21840 seconds. The default is 21840 seconds.

**Related Documentation**

- IP Packet Fragment Reassembly Overview on page 83

## Configuring Exception Handling Traceoptions

Datapath tracing operations record detailed messages about the operation of exception-handling services such as packet reassembly or IPv6 router advertisements on the MobileNext Broadband Gateway. You can trace various types of exception operations such as configuration events, memory usage, the age of a packet flow, configuration information, and other information. You can specify which trace operations are logged by including specific tracing flags and levels.

Table 12 on page 95 describes the flags relating to the exceptions that you can include at the **[edit unified-edge gateways ggsn-pgw *gateway-name* software-datapath traceoptions flag]** hierarchy level.

### Table 12: Trace Flags

| Flag | Description |
|---|---|
| **ager** | Trace flow ager. |
| **all** | Trace everything. |
| **commands** | Trace operational commands. |
| **configuration** | Trace configuration events. |
| **flow** | Trace flow. |
| **init** | Trace events related to data path daemon initialization. |
| **ipv6-router-advertisement** | Trace IPv6 router advertisement. |
| **memory** | Trace memory. |
| **reassembly** | Trace reassembly. |
| **redundancy** | Trace redundancy. |

Table 13 on page 96 describes the levels you can include.

Table 13: Trace Levels

| Level | Description |
|---|---|
| **all** | Match all levels. |
| **error** | Match error conditions. |
| **info** | Match informational messages. |
| **notice** | Match conditions that should be specially handled. |
| **verbose** | Match verbose messages. |
| **warning** | Match warning messages. |

To configure tracing options for exception operations:

1. Specify that you want to configure tracing options for exception operations.

   [edit unified-edge gateways ggsn-pgw *MBG1* software-datapath]
   user@host# **edit traceoptions**

2. Configure the filename for the trace file.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* software-datapath traceoptions]
   user@host# **set file *datapath-log***

3. (Optional) Configure the maximum size of each trace file.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* software-datapath traceoptions]
   user@host# **set file size 100m**

   NOTE: When a trace file (for example, exception-log) reaches its maximum size, it is renamed exception-log.0, then exception-log.1, and so on, until the maximum number of trace files is reached. The oldest archived file is then overwritten.

4. Configure the tracing flag.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* software-datapath traceoptions]
   user@host# **set flag all**

   NOTE: You should use care when tracing all operations on a gateway. This can have a performance impact.

5. Configure the tracing level.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* software-datapath traceoptions]
   user@host# **set level error**

6. View the trace file.

```
user@host# file show /var/log/exception-log
```

**Related Documentation**

- Understanding the Broadband Gateway Exception Handling on page 87
- Understanding GTP-U Error Exception Handling on page 88
- Understanding Broadband Gateway IP Fragment Handling on page 89
- IP Packet Fragment Reassembly Overview on page 83
- Configuring Fragment Reassembly Parameters on page 91
- Understanding IPv6 Protocol Parameters on page 92
- Configuring IPv6 Protocol Parameters on page 93
- Configuring S-GW Data Path Traceoptions on page 97
- Example: Configuring Inline IP Packet Fragment Reassembly on page 99
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105

## Configuring S-GW Data Path Traceoptions

Data path tracing operations record detailed messages about the operation of Serving Gateway (S-GW) services on the MobileNext Broadband Gateway. You can trace various types of data path operations such as packet reassembly, IPv6 router advertisements, memory usage, configuration events, and other information. You can specify which trace operations are logged by including specific tracing flags and levels.

Table 14 on page 97 describes the flags relating to the exceptions that you can include at the **[edit unified-edge gateways sgw *gateway-name* software-datapath traceoptions flag]** hierarchy level.

### Table 14: S-GW Data Path Trace Flags

| Flag | Description |
|---|---|
| **ager** | Trace flow ager. |
| **all** | Trace everything. |
| **commands** | Trace operational commands. |
| **configuration** | Trace configuration events. |
| **flow** | Trace flow. |
| **init** | Trace events related to data path daemon initialization. |
| **ipv6-router-advertisement** | Trace IPv6 router advertisement. |
| **memory** | Trace memory. |
| **reassembly** | Trace reassembly. |

Table 14: S-GW Data Path Trace Flags *(continued)*

| | |
|---|---|
| **redundancy** | Trace redundancy. |

Table 15 on page 98 describes the levels you can include.

Table 15: S-GW Datapath Trace Levels

| Level | Description |
|---|---|
| **all** | Match all levels. |
| **error** | Match error conditions. |
| **info** | Match informational messages. |
| **notice** | Match conditions that should be specially handled. |
| **verbose** | Match verbose messages. |
| **warning** | Match warning messages. |

To configure tracing options for datapath operations:

1. Specify that you want to configure tracing options for datapath operations.

   [edit unified-edge gateways sgw *MBG2* software-datapath]
   user@host# **edit traceoptions**

   NOTE: You can use the **no-remote-trace** statement at this level to disable remote tracing capabilities.

2. Configure the filename for the trace file.

   [edit unified-edge mobile gateways sgw *MBG2* software-datapath traceoptions]
   user@host# **set file *datapath-log***

3. (Optional) Configure the maximum size of each trace file.

   [edit unified-edge mobile gateways sgw *MBG2* software-datapath traceoptions]
   user@host# **set file size 100m**

   NOTE: When a trace file (for example, datapath-log) reaches its maximum size, it is renamed datapath-log.0, then datapath-log.1, and so on, until the maximum number of trace files is reached. The oldest archived file is then overwritten.

4. Configure the tracing flag.

   [edit unified-edge mobile gateways sgw *MBG2* software-datapath traceoptions]
   user@host# **set flag all**

NOTE: You should use care when tracing all operations on a gateway. This can have a performance impact.

5. Configure the tracing level.

   **[edit unified-edge mobile gateways sgw *MBG2* software-datapath traceoptions]**
   **user@host# set level error**

6. View the trace file.

   **user@host# file show /var/log/datapath-log**

**Related Documentation**

- IP Packet Fragment Reassembly Overview on page 83
- Understanding the Broadband Gateway Exception Handling on page 87
- Understanding GTP-U Error Exception Handling on page 88
- Understanding Broadband Gateway IP Fragment Handling on page 89
- Configuring Fragment Reassembly Parameters on page 91
- Understanding IPv6 Protocol Parameters on page 92
- Configuring IPv6 Protocol Parameters on page 93
- Configuring Exception Handling Traceoptions on page 95
- Configuring S-GW Traceoptions on page 32
- Configuring S-GW GTP Traceoptions on page 270
- Configuring S-GW Charging Traceoptions on page 292
- Configuring S-GW Local Persistent Storage Traceoptions on page 295

## Example: Configuring Inline IP Packet Fragment Reassembly

This example shows how to configure the MobileNext Broadband Gateway so that reassembly of fragmented IP packets is carried out inline (on the Packet Forwarding Engine) instead of performing IP reassembly on the services PIC. By default, IP reassembly is carried out on the services PIC. This example changes the default behavior of the gateway, whether the gateway is configured as a Serving Gateway (S-GW), Packet Data Network Gateway (P-GW), or Gateway GPRS Support Node (GGSN). Although Serving Gateway Support Nodes (SGSNs) also reassemble IP packets, the broadband gateway cannot be configured as an SGSN.

- Requirements on page 100
- Overview on page 100
- Configuration on page 103
- Verification on page 103
- Troubleshooting on page 104

## Requirements

This example uses the following hardware and software components:

- A supported MX Series chassis configured with supported line cards and a services PIC.
- A supported and properly installed version of 64-bit Junos OS and the **jmobile** software package.
- Correct configuration as a P-GW, S-GW, or GGSN with corresponding interfaces.

Before you configure inline IP reassembly, be sure you have:

- Configured the broadband gateway correctly.
- Configured a valid MTU size and GTP-U parameters.

## Overview

Fragmentation of IP packets for transmission and the need to reassemble the IP packets at a destination is a feature of how Layer 2 (the frame layer) and Layer 3 (the packet layer) operate. That is, the maximum size of a frame, set by the Maximum Transmission Unit (MTU) value, and the maximum size of a packet are determined independently. It is usually the case that the packet size can far exceed the MTU size. If the packet size (data plus IP and other headers) exceeds the allowable frame size (usually set by the transport medium limits), the packet must be fragmented at the sender and split across multiple frames for transmission. Frames are always processed immediately, as they arrive (if error-free), but packet fragments cannot be processed until the whole packet has been reassembled. Each packet fragment inside a frame series, except the last, has the more fragments (MF) IP header bit set, indicating that this packet is part of a whole. The last packet fragment inside a frame does not have this MF bit set and therefore ends the fragment sequence. Once all of the fragments of a packet have arrived, the entire packet can be reassembled.

When memory buffers for networking were limited, heavy intervals of arriving fragmented traffic easily resulted in performance degradations or even complete “reassembly deadlock,” with buffers occupied only with fragments and no room for any arriving fragment that might complete a packet. In some cases, a packet fragment was discarded only to find that the newly arrived frame would have completed the packet just thrown away. It is clear that efficient reassembly is important for network throughput, scalability, and graceful response to congestion.

In some cases, you can avoid the need to fragment packets on a mobile network by adjusting the MTU size to account for added headers such as GTP. However, in cases where multiple vendors are used or organization lines are crossed, this MTU adjustment might not be possible and IP fragmentation is unavoidable.

Figure 33: Fragmented Packet Requiring Reassembly

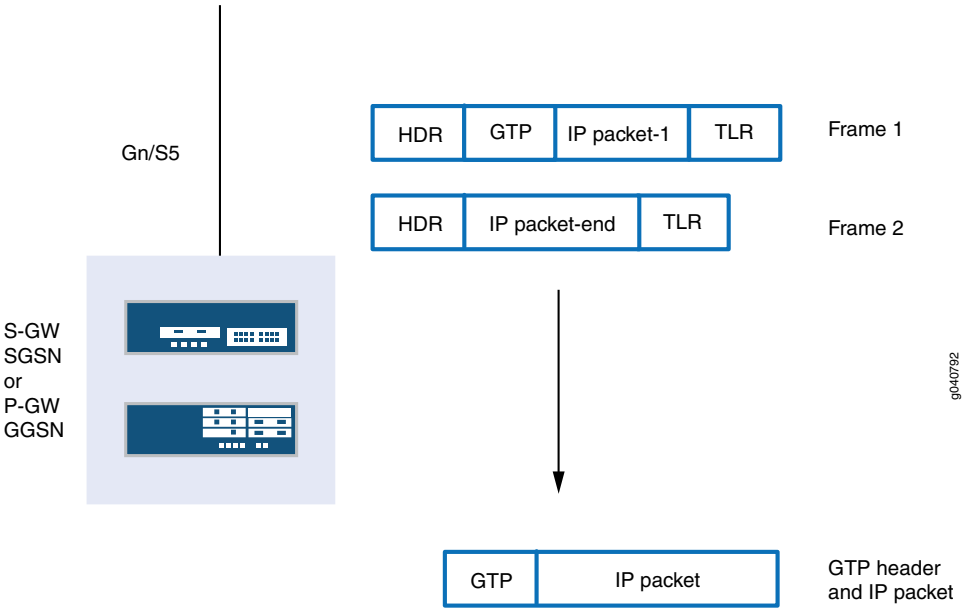
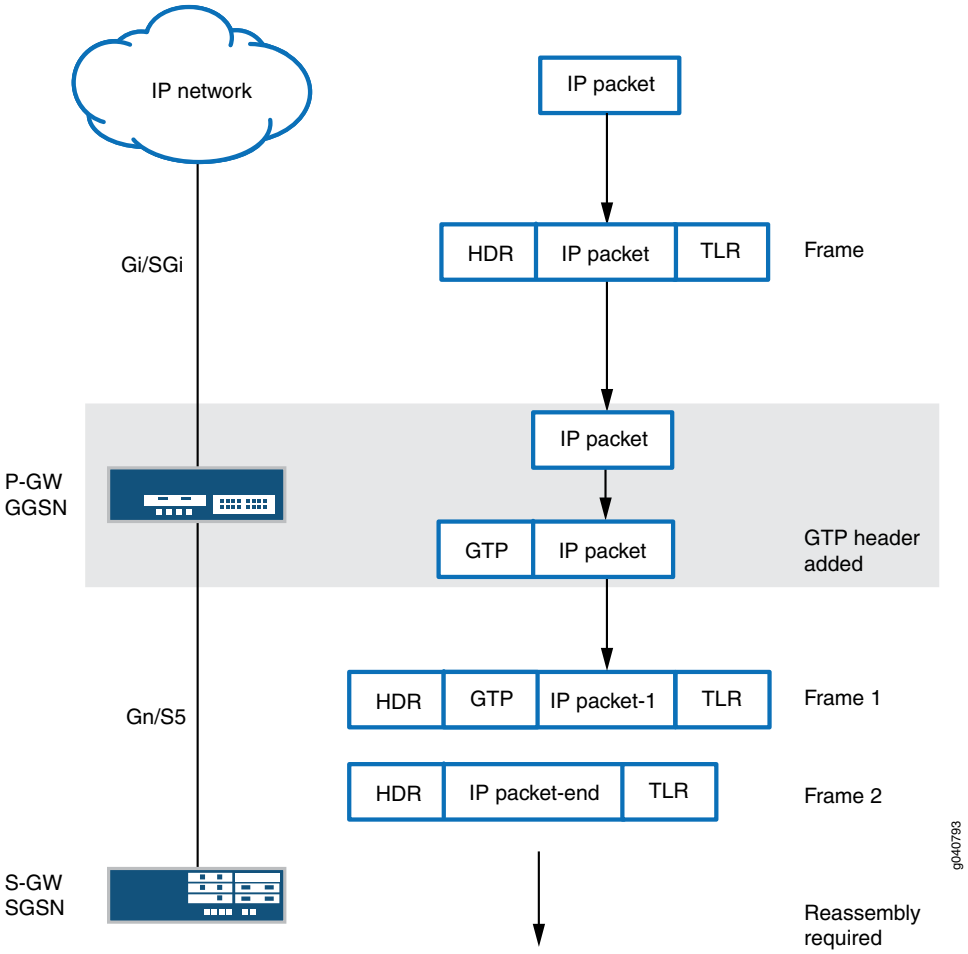



Figure 33 on page 101 shows a fragmented packet containing user data that requires reassembly on arrival on the Gn or S5 interface. On the broadband gateway, IP reassembly is carried out on the services PIC by default. This example configures the broadband gateway to perform IP reassembly of fragmented IP packets inline, on the Packet Forwarding Engine. However, inline reassembly requires the dedication of Packet Forwarding Engine resources for reassembly, which means these resources cannot be used for their usual purposes. You should consider potential trade-offs before changing the default behavior of the gateway.

## Topology

The topology for this inline reassembly example consists of two mobile network nodes, the interfaces connecting them to each other, and an IP network such as the Internet. As shown in Figure 34 on page 102, a framed downstream packet from an IP network to mobile device is sent over a Gi (3G) or SGi (LTE) interface to a GGSN or P-GW. At the GGSN/P-GW, the frame is processed and a 20-byte GTP-U header added to the packet. If the packets use the most common MTU size of 1500 bytes ( for network efficiency), the added 20 bytes put the data unit over the allowable 1500 byte limit (1500 + 20 = 1520). To send the 1520-byte packet over the Gn (3G) or S5 (LTE) interface to the SSGN or S-GW, the GGSN or P-GW must fragment the packet and distribute the 1520 bytes into two frames (1500 bytes and 20 bytes). Because frames are processed immediately as they arrive (there is no such thing as “frame 1 of 2”), the first packet fragment must be kept until the second frame is processed and completes the packet. Then the whole packet with GTP-U header can be processed, routed, and sent on downstream. This requires the SSGN or S-GW to perform the reassembly of the IP packet. Heavy traffic loads create an environment that forces the receiving node to keep track of and process many fragments at the same time.

Figure 34: A GTP-U Header Causing Fragmentation




Inline IP reassembly is enabled at the gateway level (for example, the entire P-GW or S-GW). Fragments for all IP addresses associated with the broadband gateway configured for inline reassembly are stored and reassembled on the interface on which it arrives. Enabling inline IP reassembly affects all fragments for that gateway. The mobility line cards reserve 2 MB of memory for storing fragments (non-mobility line cards reserve 8 MB).

NOTE: Inline IP reassembly of fragments arriving on different Packet Forwarding Engine complexes are not supported. These IP fragments are stored, but cannot be reassembled and eventually timeout and are dropped. The inline reassembly timeout parameter is 20 milliseconds (ms) and cannot be changed. The timeout values from 2 (default) through 60 seconds and is set for an IP reassembly profile at the **[edit services ip-reassembly *ip-reassembly-profile-name* inline-services]** hierarchy level apply to IP reassembly on the services PIC only.

Inline IP reassembly does not preclude the use of the services PIC. The packet forwarding engine could run out of memory to store fragments. In that case, new fragments that arrive are directed to the services PIC (if available) as a kind of "backup." Once the packet forwarding engine memory usage recovers, all fragments are again processed inline in the packet forwarding engine.

It should be noted that other topologies could have been used for this example. For instance, IPsec is often used to encapsulate GTP packets on the S1-U interfaces from eNodeB to S-GW. IPsec encapsulation often causes packet fragmentation as well.

## Configuration

To configure inline IP reassembly, perform these tasks:



**CLI Quick Configuration**

```
[edit unified-edge gateways ggsn-pgw MBG-PGW1 inline-services]
user@host# set ip-reassembly
```

### Configuring Inline IP Reassembly

From configuration mode, confirm your configuration by entering the **show** command at the various hierarchy levels. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

For brevity, these **show** command outputs include only the configuration that is relevant to this example.

```
[edit unified-edge]
gateways {
  ggsn-pgw MBG-PGW1 {
    [...}
    inline-services {
      ip-reassembly;
      }
    [...]
  }
}
```

## Verification

### Verifying Inline IP Reassembly Configuration

**Purpose** Verify that the Packet Forwarding Engine of the Gn or S5 or S8 interfaces associated with the broadband gateway where fragments are arriving have non-zero fragment counters and have successfully reassembled packets.

**Action** From operational mode, enter the **show services inline ip-reassembly statistics** command.

```
user@MBG-PGW-1# show services inline ip-reassembly statistics
FPC: 0
==============
                                                    Total   Current Rate
```

```
Total Fragments Received                    1004681374        6213217
   First Fragments                           502335971        3106615
   Intermediate Fragments                           0              0
   Last Fragments                            502345403        3106602

Total Packets Successfully Reassembled        71135257         432439

Approximate Packets Pending Reassembly            2408

Fragments Dropped Reasons                     1404714           7700
   Buffers not available                            0              0
   Fragments per packet exceeded                    0              0
   Packet length exceeded                           0              0
   Record insert error                              0              0
   Record in use error                        1404714           7700
   Duplicate first fragments                        0              0
   Duplicate last fragments                         0              0
   Missing first fragment                           0              0

Reassembly Errors Reasons                           0              0
   Fragment not found                               0              0
   Fragment not in sequence                         0              0
   ASIC errors                                      0              0

Aged out packets                              6147008          37279

Total Fragments Successfully Reassembled    142270514         864878

Total Fragments Dropped                       7551722          44979
   Buffers not available                            0              0
   Fragments per packet exceeded                    0              0
   Packet length exceeded                           0              0
   Record insert error                              0              0
   Record in use error                        1404714           7700
   Duplicate first fragments                        0              0
   Duplicate last fragments                         0              0
   Missing first fragment                           0              0
   Fragment not found                               0              0
   Fragment not in sequence                         0              0
   ASIC errors                                      0              0
   Aged out fragments                         6147008          37279

Total fragments punted to UPIC              854858289        5303865
```

**Meaning** The output associated with FPC 0 (in this case) displays non-zero values for packet fragments and successfully reassembled packets. Errors and dropped fragments are minimal.

## Troubleshooting

To troubleshoot inline IP reassembly, perform these tasks:

- Troubleshooting Non-Incrementing Counters on page 104
- Troubleshooting Zero Successfully Reassembled Packets on page 105

### Troubleshooting Non-Incrementing Counters

**Problem** The total fragment received counter and current rate fields are not incrementing.

**Solution** There are no fragments arriving for the gateway, or the inline reassembly statement is set for the wrong gateway.

### Troubleshooting Zero Successfully Reassembled Packets

**Problem** The counters show zero value for successfully reassembled packets.

**Solution** Examine the reasons for fragment errors and dropped fragments in **show services inline ip-reassembly statistics** command output. This is usually sufficient to determine the solution to the issue.

**Related Documentation**

- IP Packet Fragment Reassembly Overview on page 83
- Configuring IP Inline Reassembly on page 90

## Example: Configuring Broadband Gateway Exception Handling Parameters

This example shows how to configure exception handing parameters on the MobileNext Broadband Gateway. Both IP reassembly and IPv6 advertisement parameters are configured.



### Requirements

This example uses the following hardware and software components:

- An MX chassis equipped with session Dense Port Concentrators (DPCs) and three interface Packet Forwarding Engines (housed in DPCs or Modular Port Concentrators [MPCs]).
- Junos OS Mobility package

Before you begin:

- Install the chassis hardware.
- Configure the chassis, as well as interfaces, anchors, and (optionally) redundancy.

### Overview

There are four exceptions to the general rule that user packets flow only through interface Packet Forwarding Engine hardware:

- Anchor Packet Forwarding Engine failovers (N:1)
- Reassembly of GPRS tunneling protocol, user plane (GTP-U) and mobility control plane (for instance, authentication, authorization, and accounting [AAA]) fragments

- IPv6 router advertisements and router solicitation packet handling
- GTP-U error indication generation

The first and last items have no configurable parameters. This example configures parameters for IP fragment reassembly and IPv6 router advertisements. The IP fragment reassembly parameters are configured in **reassembly-profile-one** (you can have multiple reassembly profiles) and applied to the gateway (**MBG1**). All of the statements in this example use the default values.

## Configuration

**CLI Quick Configuration**

The parameters for IP fragment reassembly and IPv6 router advertisements are configured by:

```
[edit services ip-reassembly profile reassembly-profile-one]
set timeout 4 # The default (seconds)
set max-reassembly-pending-packets 1000 # The default

[edit unified-edge gateways ggsn-pgw MBG1]
set ip-reassembly reassembly-profile-one # You can apply only one profile to a gateway

[edit unified-edge gateways ggsn-pgw MBG1 ipv6-router-advertisement]
set current-hop-limit 2 # All statements use defaults
set maximum-advertisement-interval 21600
set maximum-initial-advertisement-interval 10
set maximum-initial-advertisements 10
set minimum-advertisement-interval 16200
set reachable-time 0
set retransmission-timer 100
set router-lifetime 21840
```

**Results**

From configuration mode, confirm your configuration by entering the **show** command at the various hierarchy levels. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

For brevity, these **show** command outputs include only the configuration that is relevant to this example.

```
show services ip-reassembly reassembly-profile-one
timeout 2;
max-reassembly-pending-packets 100;

show unified-edge gateways ggsn-pgw MBG1
ip-reassembly-profile {
   reassembly-profile-one;
}

show unified-edge gateways ggsn-pgw MBG1 ip-router-advertisement
current-hop-limit 2;
maximum-advertisement-interval 21600;
maximum-initial-advertisement-interval 10;
maximum-initial-advertisements 10;
minimum-advertisement-interval 16200;
```

```
    reachable-time 0;
    retransmission-timer 100;
    router-lifetime 21840;
```

After you configure the device, enter **commit** from configuration mode.

## Verification

### Verifying the IP Reassembly Configuration

**Purpose** Verify that IP reassembly exception handling is operating.

**Action** From operational mode, enter the **show unified-edge gateways ggsn-pgw ip-reassembly statistics** command.

**Meaning** Non-zero values indicate that reassembly is functioning.

NOTE: You must inspect IPv6 router advertisement packets directly to verify configured header field parameters.

### Verifying the Exception Handling Configuration

**Purpose** Verify that exception handling is operating.

**Action** From operational mode, enter the **show unified-edge gateways ggsn-pgw exception-handling statistics** command.

NOTE: You can clear these statistics with the **clear unified-edge gateways ggsn-pgw exception-handling statistics** command.

**Meaning** Non-zero values indicate that exception handling is functioning.

**Related Documentation**

- IP Packet Fragment Reassembly Overview on page 83
- Configuring IP Inline Reassembly on page 90
- Example: Configuring Inline IP Packet Fragment Reassembly on page 99
- Understanding the Broadband Gateway Exception Handling on page 87
- Understanding GTP-U Error Exception Handling on page 88
- Understanding Broadband Gateway IP Fragment Handling on page 89
- Configuring Fragment Reassembly Parameters on page 91
- Understanding IPv6 Protocol Parameters on page 92

PART 3

# APN Configuration

CHAPTER 6

# Configuring APNs



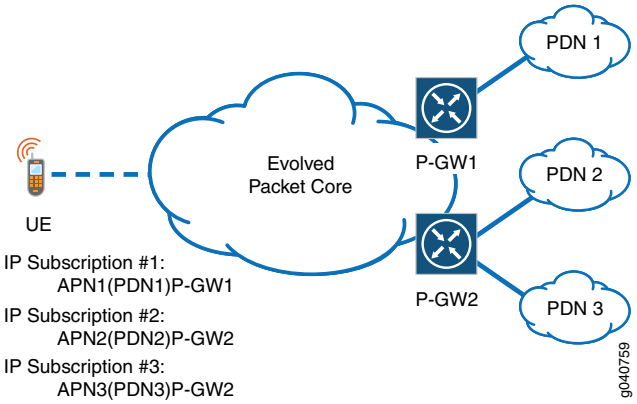
## Configuring APNs on the MobileNext Broadband Gateway Overview

You configure an access point name (APN) on the MobileNext Broadband Gateway to contain the parameters that characterize the user session to an IP network. The APN determines authorization and address allocation methods, charging rules, several types of timeouts, and various other parameters.

The broadband gateway requires more than the typical provider edge (PE) router configuration to function in a mobile network and allow mobile devices to access the Internet or a private IP network. The broadband gateway uses a unique identifier to identify each attached IP network, which is called an APN network or Packet Data Network (PDN). An APN should be as stable as the IP network it represents. The broadband gateway uses various rules, called the APN service selection method, to determine which APN and service types a Mobile Station (MS) or user equipment device should use. Mobile

devices can subscribe to multiple PDNs and services, which can be accessed through different broadband gateways. Figure 35 on page 112 shows the relationship between APNs and broadband gateways in a 4G network.

Figure 35: APNs and P-GWs in the 4G Architecture




The parameters you configure for an APN on the broadband gateway fall into five categories:

- General APN parameters:
  - Interface
  - Servers
  - Timers
  - Miscellaneous parameters
- Restriction value
- Anonymous users
- Address assignment
- Anchor PIC or Packet Forwarding Engine failure behavior
- Charging profiles

## General APN Parameters

You configure these parameters to determine the servers that the broadband gateway contacts to authorize use, resolve domain names, and so forth. You also use these parameters to set timeout values for sessions or idle devices, and determine various other APN characteristics that do not fall into the other categories.

## Restriction Value

There are many types of APNs: some attach to service-rich public networks and others attach to more circumscribed private corporate networks. Restriction values can be placed on every APN on a broadband gateway to prevent unsupported inter-APN traffic from burdening the network and ending up useless at the destination.

### Anonymous Users

Anonymous users can use PDN services without logging in as specific users. A parameter, such as the APN name, can be used to distinguish and authorize the individual user, even if anonymous, on the network.

### Address Assignment

A key function of the broadband gateway is to assign IP addresses to mobile devices. These parameters establish the Dynamic Host Configuration Protocol (DHCP) family (IPv4 or IPv6) and pool to use for this APN.

### Anchor DPC or MPC Failure Behavior

All APN sessions run through a particular Dense Port Concentrator (DPC) or Modular Port Concentrator (MPC) on the broadband gateway, called the anchor PIC or Packet Forwarding Engine. These parameters control how the broadband gateway handles a session anchored on the DPC or MPC if it should fail.

### Charging Profiles

You configure charging profile parameters to determine how the broadband gateway charges home, roaming, and visiting users.

**Related Documentation**

- Configuring General APN Parameters on the Broadband Gateway on page 115
- Configuring the Restriction Value on a Broadband Gateway APN on page 119
- Configuring Anonymous Users on a Broadband Gateway APN on page 120
- Configuring Anonymous Users on a Broadband Gateway APN on page 120
- Configuring Address Assignment on a Broadband Gateway APN on page 121
- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- Configuring Mobile Interfaces for APNs on page 126
- Configuring Mobile Interface to APN Associations in VRFs on page 128
- Configuring APN Service Selection on a Broadband Gateway on page 129
- Example: Configuring Broadband Gateway APNs on page 134

## User-Session Routing Overview

The MobileNext Broadband Gateway supports user-session routing to dynamically redirect create session requests received on the broadband gateway to another mobile network gateway, when appropriate. You configure a service-selection profile on the broadband gateway to define the conditions that trigger a redirect action to reroute user sessions. The Broadband Gateway supports user-session routing for GTP v0, GTPv1, and GTPv2.

User-session routing is enabled on the broadband gateway when the configured service selection profile for the APN includes the **redirect-peer *ip-address* then** method. When a

create session request arriving on the broadband gateway triggers a redirect (the create session request indicates a match with one of the **from** conditions configured in service-selection profile), the broadband gateway off loads the create session request to another gateway on the mobile network that has the capability to service the create session request.

A broadband gateway might route a create session request to a more appropriate gateway to anchor create session requests in the following cases:

- A configured policy, session load, or system status (for example, maintenance mode) on the receiving broadband gateway adversely impacts the ability of the broadband gateway to service the create session request.
- A configuration on the broadband gateway prevents the gateway from meeting service, billing, or other requirements for the create session request.

NOTE: **After a create session request is off loaded from the broadband gateway to another gateway (the broadband gateway receives a create session response), the broadband gateway has no further responsibility for the off-loaded subscriber session, and any subsequent data traffic or session modifications are handled by the new gateway.**

The following sequence describes the call flow for user session routing:

1. The SGW sends a create session request (source IP SGW, destination IP PGW1, source port SGW1, destination port 2123)
2. PGW1 decides to redirect the request to PGW2
3. PGW1 sends the create session request to PGW2 (source IP PGW1, destination IP PGW2, source port PGW1, destination port 2123)
4. PGW2 sends a create session response to PGW1 (source IP PGW2, source port 2123, Destination IP PGW1, destination port PGW1)
5. PGW1 replies to SGW (source IP PGW1, source port 2123, destination IP SGW, destination port SGW)

In the preceding call flow sequence, PGW1 applies a service selection profile to a Create Session Request (at Step 2) to redirect the Create Session Request message to PGW2. PGW1 operates as a proxy for the SGW (at Step 3) by inserting its network address as an SGW network address within the Create Session Request. With PGW1 acting as a proxy, PGW2 can operate as if communicating with the SGW (at Step 4) according to conventional methods without having to support new functionality. Upon receiving a successful response from PGW2, PGW1 (at Step 5) sends a Create Session Response message to the SGW, directing the SGW to use PGW2 for future communications. As a result, any data and control traffic will travel directly between the SGW and PGW2 without any interaction from PGW1.

**Related Documentation**

- Configuring APN Service Selection on a Broadband Gateway on page 129
- Configuring APNs on the MobileNext Broadband Gateway Overview on page 111

## Configuring General APN Parameters on the Broadband Gateway

To configure an access point name (APN) on the MobileNext Broadband Gateway, you set general parameters for each APN. These APN parameters determine the servers the broadband gateway contacts to authorize use, resolve domain names, and so on. These parameters also set timeout values for sessions or idle devices, and determine various other APN characteristics.

This topic includes the following tasks:



### Configuring the APN Name, Interface, and Type

Before you begin configuring an APN on a broadband gateway, you should have done the following:

- Configured the chassis of the broadband gateway
- Configured the interfaces of the broadband gateway
- Configured the general Dynamic Host Configuration Protocol (DHCP) parameters for the broadband gateway

To configure an APN on the broadband gateway, you configure a name, mobile interface, and type for the APN. Each APN has one mobile interface that must be defined as a mobile interface on the broadband gateway chassis. To configure an APN:

1. Configure an APN name.

   [edit unified-edge gateways ggsn-pgw MBG1 apn-services]
   user@host# set apn *apn-1*

   NOTE: The APN name must be fewer than 80 characters and can contain letters, numbers, decimal points, and dashes only.

2. Configure a mobile interface for the APN.

   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]
   user@host# set mobile-interface *mif-1/0/1.0*

   NOTE: The interface must be defined as a mobile interface (mif-) in the broadband gateway interface hierarchy.

3. Configure a type for the APN.

   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]

```
user@host# set apn-type real
```

NOTE: APNs can be real, virtual, or virtual-pre-authenticate.

Select one of the following APN types:

- **real**—This APN type is used when the GPRS tunneling protocol (GTP) create message contains the APN name and is used to create the session.
- **virtual**—This APN type is used when the GTP create message contains an APN name, but the name must be mapped to a real APN. The mapping is done by configuring the service selection profile.
- **virtual-pre-authenticate**—This APN type, which is similar to a virtual APN, is used when the GTP create message contains an APN name that must be mapped to a real APN. However, the mapping in this case is done by RADIUS (you must configure RADIUS for this type of APN) during the authentication response (access accept message).

NOTE: When the APN type is virtual, anonymous users must still be authenticated. This action is included in the virtual-pre-authenticate APN type.

4. Configure a data type for the APN.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]
user@host# set apn-data-type ipv4
```

NOTE: APNs can handle ipv4, ipv6, or ipv4v6 data. By default, APNs handle onlyIPv4 data.

## Configuring Servers for an APN

To configure a Domain Name System (DNS) server, NetBIOS name server (NBNS), or server to handle call session control for the APN:

1. Configure the IPv4 or IPv6 address of the primary and secondary DNS server.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]
user@host# set dns-server primary 10.10.10.9 secondary 172.16.0.7
```

2. Configure the IPv4 or IPv6 address of the primary and secondary NBNS server.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]
user@host# set nbns-server primary 192.168.27.48 secondary 10.10.9.222
```

3. Configure the IPv4 or IPv6 address of the call state control function (CSCF) server.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]
user@host# set p-cscf-server 172.16.14.25
```

## Configuring APN Timers

To configure timers to control session or idle period timeouts:

1. Configure the session timeout.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]
   user@host# set session-timeout 0
   ```

   NOTE: The range is 0 through 720 hours, with a default of 0 hours. A value of 0 hours means the session will never time out when active.

2. Configure the idle timeout.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]
   user@host# set idle-timeout 0
   ```

   NOTE: The range is 0 through 300 minutes, with a default of 0 minutes. A value of 0 minutes means the session will never time out during idle periods.

3. Configure the idle timeout direction.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]
   user@host# set idle-timeout-direction both
   ```

   NOTE: The direction can be **both** uplink or downlink, or idle detected in the **uplink** direction only. The default is to detect idle periods in both directions.

## Configuring Miscellaneous APN Parameters

To configure authorization profiles, inter-mobile traffic behavior, and various other parameters for the APN:

1. Configure the RADIUS authorization, authentication, and accounting (AAA) profile.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]
   user@host# set aaa-profile aaa-access-profile-1
   ```

   NOTE: The RADIUS profile must be configured in the AAA hierarchy.

2. Configure inter-mobile device capabilities.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]
   user@host# set inter-mobile redirect 10.10.10.4
   ```

NOTE: Your can deny mobile-to-mobile device traffic, or you can redirect it through another IP device address before delivery. The default is to allow mobile-to-mobile communication on the APN.

3. Configure the APN access selection method.

   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]
   user@host# set selection-mode *from-sgsn*

   NOTE:
   The selection modes mean:

   - from-ms—Admit subscribers with a mobile-station-provided APN without a verified subscription.
   - from-sgsn—Admit subscribers with a network-provided APN without a verified subscription.
   - no-subscribed—Reject subscribers with a mobile-station-provided or a network-provided APN, with a verified subscription.

4. Configure source address verification so the APN checks the validity of the mobile device source address.

   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]
   user@host# set verify-source-address

5. Configure the maximum number of bearers (PDP contexts) allowed.

   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]
   user@host# set maximum-bearers *1000000*

   NOTE: Your can allow 100000 (one hundred thousand) to 12000000 (twelve million) bearers on the APN. There is no default.

6. Configure visitor blocking for this APN, which will prohibit visitors from accessing this APN (visitors are allowed by default). Visitors are defined as subscribers where the Serving GPRS Support Node (SGSN) or Serving Gateway (S-GW) belong to the same public land mobile network (PLMN), but the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW) are in a different PLMN.

   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]
   user@host# set block-visitors

7. Configure sessions to wait for accounting to engage for this APN (sessions do not wait by default).

   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]
   user@host# set wait-accounting

**Related Documentation**

- Configuring APNs on the MobileNext Broadband Gateway Overview on page 111
- Configuring the Restriction Value on a Broadband Gateway APN on page 119
- Configuring Anonymous Users on a Broadband Gateway APN on page 120
- Configuring Anonymous Users on a Broadband Gateway APN on page 120
- Configuring Address Assignment on a Broadband Gateway APN on page 121
- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- Configuring Mobile Interfaces for APNs on page 126
- Configuring Mobile Interface to APN Associations in VRFs on page 128
- Configuring APN Service Selection on a Broadband Gateway on page 129
- Example: Configuring Broadband Gateway APNs on page 134

## Configuring the Restriction Value on a Broadband Gateway APN

Access point names (APNs) serve different purposes in a mobile network. Some APNs attach mobile devices to public Packet Data Networks (PDNs) such as the Internet, while others attach mobile devices to private corporate networks. Different networks can have different capabilities and supported services. In many cases, the inter-mobile-device traffic for devices attached to different APNs must be restricted so that the network does not waste resources sending packets to a network that does not support them.

Before you begin configuring the restriction value on a MobileNext Broadband Gateway APN, you should have done the following:

- Configured the chassis of the broadband gateway
- Configured the interfaces of the broadband gateway
- Configured the general APN parameters for the specific APN

You configure the restriction value for an APN based on the applications allowed on this APN and on other APNs configured on the broadband gateway. When you configure the restriction value, users cannot, for example, send Multimedia Messaging Service (MMS) or Wireless Application Protocol (WAP) messages to a user on an APN that does not support MMS or WAP. Table 16 on page 119 shows the maximum restriction value for an APN, the type of APN the restriction can apply to, application examples, and the restriction values allowed on other APNs. By default, there are no restrictions on traffic sent from one APN to another.

### Table 16: APN Restriction Values

| Maximum APN Restriction Value | Type of APN | Application Example | Allowed Restriction Values on Other APNs |
|---|---|---|---|
| 0 | NA | NA | Any |
| 1 | Public Type 1 | WAP or MMS | 1, 2, or 3 |

Table 16: APN Restriction Values *(continued)*

| Maximum APN Restriction Value | Type of APN | Application Example | Allowed Restriction Values on Other APNs |
|---|---|---|---|
| 2 | Public Type 2 | Internet or other PDN | 1 or 2 |
| 3 | Private Type 1 | Corporate network MMS | 1 |
| 4 | Private Type 2 | Corporate network without MMS | None |

To configure the restriction value for an APN:

1. **[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]**
   **user@host# set restriction-value *0***

**Related Documentation**

- Configuring APNs on the MobileNext Broadband Gateway Overview on page 111
- Configuring General APN Parameters on the Broadband Gateway on page 115
- Configuring Anonymous Users on a Broadband Gateway APN on page 120
- Configuring Address Assignment on a Broadband Gateway APN on page 121
- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- Configuring Mobile Interfaces for APNs on page 126
- Configuring Mobile Interface to APN Associations in VRFs on page 128
- Configuring APN Service Selection on a Broadband Gateway on page 129
- Example: Configuring Broadband Gateway APNs on page 134

## Configuring Anonymous Users on a Broadband Gateway APN

Before you begin configuring anonymous user parameters on a MobileNext Broadband Gateway access point name (APN), you should have done the following:

- Configured the chassis of the broadband gateway
- Configured the interfaces of the broadband gateway
- Configured the general APN parameters for the specific APN

To verify anonymous users on the broadband gateway, you configure a default username and password for authentication. Without this username and password, the broadband gateway does not accept anonymous users. You also specify a method to use for verification to prevent fraud using the device's International Mobile Station Identity (IMSI), Mobile Subscriber Integrated Services Digital Network (MSISDN) number, or APN name.

To configure anonymous user parameters on a broadband gateway APN:

1. Configure the username and verification method for anonymous users on **apn-1**.

   **[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1 anonymous-user]**

user@host# set user-name*use-apnname user-name*

NOTE: Alternatively, you can configure set use-msidn, set use-apnname, or set use-imsi as an anonymous username for authentication. There is no default name.

2. Configure the password for anonymous users on **apn-1**:

   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1 anonymous-user]
   user@host# set password *2*20Is550*

NOTE: The password can be up to 32 characters long.

**Related Documentation**

- Configuring APNs on the MobileNext Broadband Gateway Overview on page 111
- Configuring General APN Parameters on the Broadband Gateway on page 115
- Configuring the Restriction Value on a Broadband Gateway APN on page 119
- Configuring Address Assignment on a Broadband Gateway APN on page 121
- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- Configuring Mobile Interfaces for APNs on page 126
- Configuring Mobile Interface to APN Associations in VRFs on page 128
- Configuring APN Service Selection on a Broadband Gateway on page 129
- Example: Configuring Broadband Gateway APNs on page 134

## Configuring Address Assignment on a Broadband Gateway APN

One of the key roles of the MobileNext Broadband Gateway configured as either a 3G gateway GPRS support node (GGSN) or 4G Packet Data Network Gateway (P-GW) is to assign IP addresses to a mobile device. This topic configures the address assignment parameters for an access point name (APN).

Before you begin configuring address assignment on a broadband gateway APN, you should have done the following:

- Configured the chassis of the broadband gateway
- Configured the interfaces of the broadband gateway
- Configured the general APN parameters for the specific APN
- Configured the general Dynamic Host Configuration Protocol (DHCP) parameters for the broadband gateway

To assign IP addresses to devices accessing the broadband gateway APN, you configure a DHCP IPv4 and IPv6 proxy client based on DHCP profiles. The address pools can be

included in or excluded from the APN. You can also configure parameters for static address use and authentication, authorization, and accounting (AAA).

To configure address assignment on a broadband gateway APN:

1. Configure address assignment to use AAA on **apn-1**.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1
     address-assignment]
   user@host# set aaa
   ```

2. Configure address assignment to allow user equipment to provide a static address that is not verified by AAA on **apn-1**.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1
     address-assignment]
   user@host# set allow-static-ip-address no-aaa-verify
   ```

3. Configure AAA to override the address received by the DHCP proxy client for this APN.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1
     address-assignment]
   user@host# set dhcp-proxy-client aaa-override
   ```

4. Optionally, configure the logical system for the DHCPv4 proxy client profile to use for this APN.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1
     address-assignment]
   user@host# set dhcpv4-proxy-client-profile logicial-system logicial-system-name
   ```

   NOTE: This is the logical system where the DHCPv4 proxy client profile is defined. If this is not specified, the default logical system is used.

5. Optionally, configure the address pool name for the DHCPv4 proxy client profile to use for this APN.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1
     address-assignment]
   user@host# set dhcpv4-proxy-client-profile pool-name pool-name
   ```

   NOTE: This is the name of the address pool sent to the DHCP server.

6. Configure the profile name for the DHCPv4 proxy client profile to use for this APN.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1
     address-assignment]
   user@host# set dhcpv4-proxy-client-profile profile-name profile-name
   ```

   NOTE: The DHCPv6 profile parameters must be defined.

7. Optionally, configure the routing instance for the DHCPv4 proxy client profile to use for this APN.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1
  address-assignment]
user@host# set dhcpv4-proxy-client-profile routing-instance ruiting-instance-name
```

NOTE: This is the routing instance where the DHCPv4 proxy client profile is defined. If this is not specified, the default routing instance is used.

8. Optionally, configure the logical system for the DHCPv6 proxy client profile to use for this APN.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1
  address-assignment]
user@host# set dhcpv6-proxy-client-profile logicial-system logicial-system-name
```

NOTE: This is the logical system where the DHCPv6 proxy client profile is defined. If this is not specified, the default logical system is used.

9. Optionally, configure the address pool name for the DHCPv6 proxy client profile to use for this APN.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1
  address-assignment]
user@host# set dhcpv6-proxy-client-profile pool-name pool-name
```

NOTE: This is the name of the address pool sent to the DHCP server.

10. Configure the profile name for the DHCPv6 proxy client profile to use for this APN.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1
  address-assignment]
user@host# set dhcpv6-proxy-client-profile profile-name profile-name
```

NOTE: The DHCPv6 profile parameters must be defined.

11. Optionally, configure the routing instance for the DHCPv4 proxy client profile to use for this APN.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1
  address-assignment]
user@host# set dhcpv6-proxy-client-profile routing-instance routing-instance-name
```

NOTE: This is the routing instance where the DHCPv4 proxy client profile is defined. If this is not specified, the default routing instance is used.

12. Configure the IPv4 address pool or group for this APN.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1
  address-assignment]
```

```
user@host# set inet-pool pool pool-name
user@host# set inet-pool group group-name
```

NOTE: The address pool or group referenced must be defined.

13. Configure one or more IPv4 address pools to exclude for this APN.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1
  address-assignment]
user@host# set inet-pool exclude-pools pool-name(s)
```

NOTE: The address pool or group referenced must be defined.

14. Configure the IPv6 address pool or group for this APN.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1
  address-assignment]
user@host# set inet6-pool pool pool-name
user@host# set inet6-pool group group-name
```

NOTE: The address pool or group referenced must be defined.

15. Configure one or more IPv6 address pools to exclude for this APN.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1
  address-assignment]
user@host# set inet6-pool exclude-v6pools v6pool-name(s)
```

NOTE: The address pool or group referenced must be defined.

16. Optionally, configure AAA to override local address assignment for this APN.

```
user@host# set local aaa-override
```

**Related Documentation**

- Configuring APNs on the MobileNext Broadband Gateway Overview on page 111
- Configuring General APN Parameters on the Broadband Gateway on page 115
- Configuring the Restriction Value on a Broadband Gateway APN on page 119
- Configuring Anonymous Users on a Broadband Gateway APN on page 120
- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- Configuring Mobile Interfaces for APNs on page 126
- Configuring Mobile Interface to APN Associations in VRFs on page 128
- Configuring APN Service Selection on a Broadband Gateway on page 129
- Example: Configuring Broadband Gateway APNs on page 134

## Configuring Charging and Local Policy Profiles on a Broadband Gateway APN

The Mobile Next Broadband Gateway applies different charging profiles to different types of users.

Before you begin configuring charging profiles on a broadband gateway access point network (APN), you should have done the following:

- Configured the chassis of the broadband gateway
- Configured the interfaces of the broadband gateway
- Configured the general APN parameters for the specific APN
- Configured the charging details and quality-of-servce (QoS) local policy profiles for the broadband gateway

To assign charging profiles to various types of users accessing an APN on the broadband gateway, you associate a user type with a charging profile name. The charging profile details for the APN users must be configured first. The default charging profile is used when a more specific profile does not apply. To assign local policy profiles for QoS purposes to an APN, you reference the name of the local policies group and its member profiles in the APN.

Based on a comparison of public land mobile networks (PLMNs), the mobile user falls into one of three categories:

- Home user—The subscriber, the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW), and Serving GPRS Support Node (SGSN) or Serving Gateway (S-GW) are all in the same PLMN.
- Roaming user—The subscriber and GGSN or P-GW belong to the same PLMN, but the SSGN or S-GW are in a different PLMN.
- Visiting user—The subscriber and SGSN or S-GW belong to the same PLMN, but the GGSN or P-GW are in a different PLMN.

To configure charging profiles on a broadband gateway APN:

1. Configure the default charging profile that is used by **apn-1** when no other profile applies.

   **[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1 charging]**
   **user@host# set default-charging-profile *default-charging-profile-apn-1***

2. Configure the home user's charging profile for **apn-1**.

   **[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1 charging]**
   **user@host# set home-charging-profile *home-charging-profile-apn-1***

3. Configure the roaming user's charging profile for **apn-1**.

   **[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1 charging]**
   **user@host# set roamer-charging-profile *roamer-charging-profile-apn-1***

4. Configure the visiting user's charging profile for **apn-1**.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1 charging]
user@host# set visitor-charging-profile visitor-charging-profile-apn-1
```

5. Configure the broadband gateway to select the charging profile sent by the SGSN or S-GW first, sent by the RADIUS server next, or use the charging profiles statically configured locally for **apn-1**. These three options work in order you enter them.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1 charging]
user@host# set profile-selection-order serving
user@host# set profile-selection-order radius
user@host# set profile-selection-order static
```

NOTE: You do not have to use all three options.

**Related Documentation**

- Configuring APNs on the MobileNext Broadband Gateway Overview on page 111
- Configuring General APN Parameters on the Broadband Gateway on page 115
- Configuring the Restriction Value on a Broadband Gateway APN on page 119
- Configuring Anonymous Users on a Broadband Gateway APN on page 120
- Configuring Address Assignment on a Broadband Gateway APN on page 121
- Configuring Mobile Interfaces for APNs on page 126
- Configuring Mobile Interface to APN Associations in VRFs on page 128
- Configuring APN Service Selection on a Broadband Gateway on page 129
- Example: Configuring Broadband Gateway APNs on page 134

## Configuring Mobile Interfaces for APNs

You configure the MobileNext Broadband Gateway with mobile interfaces (**mif-**) for access point name (APN) traffic. The mobile interfaces are distinct from other type of interfaces and are used to associate an APN with a physical interface in a virtual routing and forwarding table (VRF). You need to configure one mobile interface unit for every APN. Every APN is associated with a single logical interface (unit) on a physical port represented by a mobile interface unit.

Before you begin, you should have done the following:

- Installed the broadband gateway
- Installed the boards of the broadband gateway
- Decided how many initial or additional APNs are required (you can add APNs after initial configuration)

To configure a mobile interface for mobility, you configure one or more logical interfaces (units) for the interface:

1. Configure the logical interface.

```
[edit interfaces]
user@host# set mif unit 0 family inet
```

2. Optionally, configure the maximum transmission unit (MTU) size for the mobile interface.

```
[edit interfaces]
user@host# set mif mtu 1200
```

NOTE: MTU sizes are not mobility specific. However, MTU size is important because the GPRS tunneling protocol (GTP) header can cause a data unit to exceed the maximum frame size when the tunnel headers are added. This causes an error.

3. Optionally, configure the access control list (ACL) filters to apply to uplink and downlink traffic. By default, the APN accepts all mobile traffic. You can selectively accept or reject mobile traffic based on filter actions.

```
[edit interfaces]
user@host# set mif unit 0 filter input input-mif-unit0-filter
user@host# set mif unit 0 filter output output-mif-unit0-filter
```

NOTE: Filter configuration is not covered as part of mobility topics. The filtering is not mobility specific.

4. Optionally, configure the service filters to apply to uplink and downlink traffic at the APN level. Typically, these filters would provide services such as Network Address translation (NAT) to mobile traffic. By default, no such services are applied to mobile traffic:

```
[edit interfaces]
user@host# set mif unit 0 service input service-filter input-service-unit0 service-set
  nat-service-unit0
user@host# set mif unit 0 service output service-filter input-service-unit0 service-set
  nat-service-unit0
```

NOTE: Service filter configuration is not covered as part of mobility topics. Service filtering is not mobility specific.

**Related Documentation**

- Configuring APNs on the MobileNext Broadband Gateway Overview on page 111
- Configuring General APN Parameters on the Broadband Gateway on page 115
- Configuring the Restriction Value on a Broadband Gateway APN on page 119
- Configuring Anonymous Users on a Broadband Gateway APN on page 120
- Configuring Address Assignment on a Broadband Gateway APN on page 121
- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125

- Configuring Mobile Interface to APN Associations in VRFs on page 128
- Configuring APN Service Selection on a Broadband Gateway on page 129
- Example: Configuring Broadband Gateway APNs on page 134

## Configuring Mobile Interface to APN Associations in VRFs

The MobileNext Broadband Gateway associates mobile interfaces (**mif-**) with access point names (APNs). Every APN is associated with a single logical interface (unit) on a physical port represented by a mobile interface unit. The mapping of the mobile interface to physical interface is usually done in a virtual routing and forwarding (VRF) table. Using a VRF for each APN allows isolation of routing information and protocols by customer and simplifies gateway operation.

Before you begin, you should have done the following:

- Installed the broadband gateway
- Installed the boards of the broadband gateway
- Configured the physical interfaces on the broadband gateway chassis (this process is not mobility-specific)
- Configured the mobility interfaces on the broadband gateway chassis

To configure a mobility-interface-to-APN mapping in a VRF, specify the VRF and place both the mobile logical interface (unit) and the physical interface unit (the Gi or SGi interface for the APN) in the same VRF. This procedure places **mif.1** and **ge-0/0/0.5** in a VRF called **User1-VRF** and places **mif.2** and **ge-0/0/0.0** in a VRF called **User2-VRF**.

1. Configure the mobility logical interface for **User1-VRF**:

   ```
   [edit routing-instances]
   user@host# set User1-VRF interface mif.1
   user@host# set User1-VRF interface ge-0/0/0.5
   ```

2. Configure the mobility logical interface for **User2-VRF**:

   ```
   [edit routing-instances]
   user@host# set User2-VRF interface mif.2
   user@host# set User2-VRF interface ge-0/0/0.0
   ```

NOTE: Normally, you would configure more statements for a VRF, but those additional statements are not mobility specific and not covered here.

**Related Documentation**

- Configuring APNs on the MobileNext Broadband Gateway Overview on page 111
- Configuring General APN Parameters on the Broadband Gateway on page 115
- Configuring the Restriction Value on a Broadband Gateway APN on page 119
- Configuring Anonymous Users on a Broadband Gateway APN on page 120

## Configuring APN Service Selection on a Broadband Gateway

The MobileNext Broadband Gateway can select an access point name (APN) in various ways. You configure an APN service selection method as an "if-then" construction similar to other Junos OS policies using **from** and **then** statements.

Before you begin configuring APN service selection on a broadband gateway APN, you should have done the following:

- Configured the chassis of the broadband gateway
- Configured the interfaces of the broadband gateway
- Configured the APN parameters for the specific APN

To configure an APN selection method, you can choose one or more of the following **from** conditions:

- **anonymous-user**—Match anonymous users to select the APN.
- **charging-characteristics** ***value***—Match the charging characteristics value from 1 through 65,535 to select the APN.
- **domain-name** ***domain-name***—Use the domain name to select the APN.
- **imei** ***imei-prefix***—Use the International Mobile Equipment Identity (IMEI) prefix configured to select the APN.
- **imsi** ***imsi-prefix***—Use the International Mobile Subscriber Identity (IMSI) prefix configured to select the APN.
- **maximum-bearers** ***value***—Match the number of bearers in the gateway from 1 through 10,000,000 (10 million) to select the APN.
- **msisdn** ***msisdn-number-prefix***—Use the Mobile Station Integrated Services Digital Network (MSISDN) prefix configured to select the APN.
- **pdn-type (***ipv4* **|** *ipv6* **|** *ipv4v6***)**—Use the IP version configured to select the APN.
- **peer** ***ip-address***—Use the IP address of the peer creating the session to select the APN.
- **peer-routing-instance** ***routing-instance-name***—Use the routing instance of the peer creating the session to select the APN.
- **plmn**—Use the public land mobile network (PLMN) to select the APN. You can specify the following attributes for the PLMN.

  - except—Select the APN for PLMNs not matching the specified PLMNs (mobile country codes [MCCs] and mobile network codes [MNCs]).
  - **mcc** *mcc* **mnc** *mnc*—Use the PLMN specified to select the APN, if the **except** statement is not configured.

- **rat-type (EUTRAN | GERAN | HSPA | UTRAN | WLAN)**—Use the type of Radio Access Technology (RAT) to select the APN.
- **roaming-status (home | roamer | visitor)**—Use the subscriber's roaming status to select the APN.

NOTE: Multiple terms can be configured in a selection profile, and each term is applied in the order in which it is configured. Furthermore, multiple match conditions can be specified within a term and all of the conditions have to match. Once a matching term is found, the action is applied and no further terms are matched. If no term matches for a subscriber, then the services associated with the APN in the Create Session Request message are applied.

To configure an APN selection method, you can choose one of the following **then** conditions:

- **accept**—Accept all connections that match the term.
- **apn-name** ***apn-name***—Select this real APN name.
- **charging-profile** ***charging-profile-name***—Select this charging profile.
- **pcef-profile** ***pcef-profile-name***—Select this policy and charging enforcement function (PCEF) profile.
- **redirect-peer** ***ip-address***—Select this redirected peer address to access the APN.
- **reject**—Reject all connections that match the term.

To configure APN service selection **from** statements on a broadband gateway:

1. Configure the **anonymous-user from** method in a term called *select-apn* in a selection profile called *apn-1-selection*.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 service-selection-profiles profile
     apn-1-selection term select-apn]
   user@host# set from anonymous-user
   ```

2. Configure the **charging-characteristics from** method in a term called *select-apn* in a selection profile called *apn-1-selection*.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 service-selection-profiles profile
     apn-1-selection term select-apn]
   user@host# set from charging-characteristics 12345
   ```

3. Configure the **domain-name from** method in a term called *select-apn* in a selection profile called *apn-1-selection*.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 service-selection-profiles profile
     apn-1-selection term select-apn]
   ```

user@host# **set from domain-name** ***www.juniper.net***

4. Configure the **imei from** method in a term called *select-apn* in a selection profile called *apn-1-selection*.

   NOTE: Terms can be up to 63 characters long.

   [edit unified-edge gateways ggsn-pgw MBG1 service-selection-profiles profile apn-1-selection term select-apn]
   user@host# **set from imei** ***imei-number-prefix***

   NOTE: The IMEI prefix matches the specified digits. For example, **from imei 12345** matches the first five digits as given, then any other digits.

5. Configure the **imsi from** method in a term called *select-apn* in a selection profile called *apn-1-selection*.

   [edit unified-edge gateways ggsn-pgw MBG1 service-selection-profiles profile apn-1-selection term select-apn]
   user@host# **set from imsi** ***imsi-number-prefix***

   NOTE: The IMSI prefix matches the specified digits. For example, **from imsi 1222** matches the first four digits as given, then any other digits.

6. Configure the **maximum-bearers from** method in a term called *select-apn* in a selection profile called *apn-1-selection*.

   [edit unified-edge gateways ggsn-pgw MBG1 service-selection-profiles profile apn-1-selection term select-apn]
   user@host# **set from maximum-bearers** ***123456***

7. Configure the **msisdn from** method in a term called *select-apn* in a selection profile called *apn-1-selection*.

   [edit unified-edge gateways ggsn-pgw MBG1 service-selection-profiles profile apn-1-selection term select-apn]
   user@host# **set from msisdn** ***msisdn-number-prefix***

   NOTE: The MSISDN prefix matches the specified digits. For example, **from msisdn 1212555** matches the first seven digits as given, then any other digits.

8. Configure the **pdn-type from** method in a term called *select-apn* in a selection method called *apn-1-selection*.

   [edit unified-edge apn-service-selection apn-1-selection term select-apn]
   user@host# **set from pdn-type [** ***ipv4*** **|** ***ipv6*** **|** ***ipv4v6*** **]**

9. Configure the **peer from** method in a term called *select-apn* in a selection profile called *apn-1-selection*.

```
[edit unified-edge gateways ggsn-pgw MBG1 service-selection-profiles profile
  apn-1-selection term select-apn]
user@host# set from peer 192.168.1.20
```

10. Configure the **peer-routing-instance from** method in a term called *select-apn* in a selection profile called *apn-1-selection*.

```
[edit unified-edge gateways ggsn-pgw MBG1 service-selection-profiles profile
  apn-1-selection term select-apn]
user@host# set from peer-routing-instance mobility-instance
```

11. Configure the **plmn from** method in a term called *select-apn* in a selection profile called *apn-1-selection*.

```
[edit unified-edge gateways ggsn-pgw MBG1 service-selection-profiles profile
  apn-1-selection term select-apn]
user@host# set from plmn except
user@host# set from plmn mcc mcc
user@host# set from plmn mnc mnc
```

NOTE:

- If you configure the **except** statement, then the PLMNs except the ones specified here are matched.
- You can specify more than one PLMN by including the **mcc** and **mnc** statements multiple times.

12. Configure the **rat-type from** method in a term called *select-apn* in a selection profile called *apn-1-selection*.

```
[edit unified-edge gateways ggsn-pgw MBG1 service-selection-profiles profile
  apn-1-selection term select-apn]
user@host# set from rat-type EUTRAN
```

NOTE: The RAT type can be either EUTRAN, GERAN, HSPA, UTRAN, or WLAN.

13. Configure the **roaming-status from** method in a term called *select-apn* in a selection profile called *apn-1-selection*.

```
[edit unified-edge gateways ggsn-pgw MBG1 service-selection-profiles profile
  apn-1-selection term select-apn]
user@host# set from roaming-status home
```

NOTE: The subscriber's roaming status can be either home, roamer, or visitor.

To configure APN service selection **then** statements on a broadband gateway:

NOTE: You can specify only one action to be applied for a term.

1. Configure the **accept then** method in a term called *select-apn* in a selection method called *apn-1-selection*.

   ```
   [edit unified-edge apn-service-selection apn-1-selection term select-apn]
   user@host# set then accept
   ```

   NOTE: If you configure the **accept** statement, then the following is applicable:

   - None of other actions to be carried out for a term can be configured.
   - Matching of additional terms is stopped and all connections that matched the term are accepted.

2. Configure the **apn-name then** method in a term called *select-apn* in a selection method called *apn-1-selection*.

   ```
   [edit unified-edge apn-service-selection apn-1-selection term select-apn]
   user@host# set then apn-name MBG1-apn
   ```

3. Configure the **charging-profile then** method in a term called *select-apn* in a selection method called *apn-1-selection*.

   ```
   [edit unified-edge apn-service-selection apn-1-selection term select-apn]
   user@host# set then charging-profile charging-profile-name
   ```

   NOTE: The charging profile must be previously configured on the broadband gateway at the **[edit unified-edge gateways ggsn-pgw *gateway-name* charging]** hierarchy level.

4. Configure the **pcef-profile then** method in a term called *select-apn* in a selection method called *apn-1-selection*.

   ```
   [edit unified-edge apn-service-selection apn-1-selection term select-apn]
   user@host# set then pcef-profile pcef-profile-name
   ```

   NOTE: The PCEF profile must be previously configured on the broadband gateway at the **[edit unified-edge pcef]** hierarchy level.

5. Alternatively, configure the **redirect-peer *ip-address* then** method in a term called *select-apn* in a selection method called *apn-1-selection*.

   ```
   [edit unified-edge apn-service-selection apn-1-selection term select-apn]
   user@host# set then redirect-peer 192.168.20.1
   ```

6. Configure the **reject then** method in a term called *select-apn* in a selection method called *apn-1-selection*.

```
[edit unified-edge apn-service-selection apn-1-selection term select-apn]
user@host# set then reject
```

NOTE: If you configure the **reject** statement, then the following is applicable:

- None of other actions to be carried out for a term can be configured.
- Matching of additional terms is stopped and all connections that matched the term are rejected.

**Related Documentation**

- Configuring APNs on the MobileNext Broadband Gateway Overview on page 111
- Configuring General APN Parameters on the Broadband Gateway on page 115
- Configuring the Restriction Value on a Broadband Gateway APN on page 119
- Configuring Anonymous Users on a Broadband Gateway APN on page 120
- Configuring Address Assignment on a Broadband Gateway APN on page 121
- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- Configuring Mobile Interfaces for APNs on page 126
- Configuring Mobile Interface to APN Associations in VRFs on page 128
- Example: Configuring Broadband Gateway APNs on page 134

## Example: Configuring Broadband Gateway APNs

This example shows how to configure an access point name (APN) on the MobileNext Broadband Gateway. The APN interfaces, including the mobile interface (**mif-**), are placed into a virtual routing and forwarding (VRF) routing instance.

- Requirements on page 134
- Overview on page 135
- Configuration on page 136
- Verification on page 137

### Requirements

This example uses the following hardware and software components:

- An MX chassis equipped with session Dense Port Concentrators (DPCs) and three interface PFEs (housed in Modular Port Concentrators [MPCs]).
- The Junos OS Mobility package software

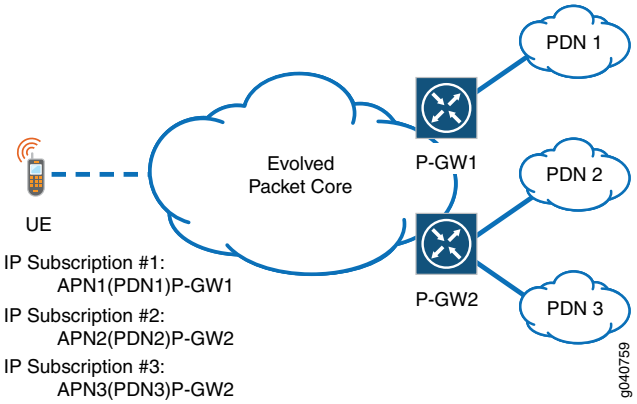
Before you begin:

- Install the chassis hardware.
- Configure the chassis, as well as interfaces, anchor Session PICs and anchor PFEs, and (optionally) redundancy.

## Overview

Figure 36 on page 135 shows the role of APNs in a 4G network (APNs apply to other mobile network generations as well). APNs contain the parameters used to characterize a user session with a packet network. The broadband gateway uses the APN to identify an attached IP network.

### Figure 36: APNs Connect Mobile Devices to IP Networks Through a P-GW




In this example, the broadband gateway has only one APN configured. Not all parameters are configured in this example, and many of them document default values (this is not an unusual practice: the default values are now clearly visible to all). All mobile devices attach to this APN. The mobile interface is configured and then the interfaces for the APN are placed in a separate VRF.

In detail, the broadband gateway is named **MBG1** and the APN is called **apn-1**. The MIF interface is configured as **mif.0** and is a real APN. The APN includes Domain Name System (DNS) and proxy call session control function (P-CSCF) servers. All timers use the default values, and includes an authentication, authorization, and accounting (AAA) profile called **aaa-access-profile-1** (this profile is configured under the unified-edge AAA mobility hierarchy level). All other general APN parameters either use the default values or are not configured.

This APN configuration places no restrictions on inter-mobile traffic sent within the APN (this is the default). The APN supports only IPv4 and the address assignment method uses the default timer value (0) so that addresses can be re-used immediately. The address pool is called **pool-1** (you can configure a pool or group, but not both for an APN). No pools are excluded.

The APN references only the default charging profile. The APN configures one MIF interface (taking all default values) called **mif.0** and associates the mobile interface and the local

IP interface (Gi or SGi: in this case **ge-0/0/0.5**) in a VRF called **User1-VRF**. (No other VRF parameters are shown.) The APN service selection method (called **apn-1-selection**) takes the most inclusive **from** (a blank clause) in term **select-apn** and assigns all traffic to **apn-1**.

## Configuration

**CLI Quick Configuration**

The APN referenced above is configured by:

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services]
user@host# set apn apn-1

[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1]
user@host# set mobile-interface mif.0
user@host# set apn-type real
user@host# set apn-data-type ipv4
user@host# set dns-server primary-v4 10.10.10.9 secondary-v4 172.16.0.7
user@host# set p-cscf 172.16.14.25
user@host# set session-timeout 0
user@host# set idle-timeout 0
user@host# set idle-timeout-direction both
user@host# set aaa-profile aaa-access-profile-1
user@host# set restriction-value 0

[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1
  address-assignment-method]
user@host# set aaa
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1 address-assignment
  inet-pool]
user@host# set pool pool-1

[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1 charging]
user@host# set default-charging-profile default-charging-profile-apn-1

[edit interfaces]
user@host# set mif unit 0 family inet

[edit routing-instances]
user@host# set User1-VRF interface mif.0
user@host# set User1-VRF interface ge-0/0/0.5
```

**Results**

From configuration mode, confirm your configuration by entering the **show** command at the various hierarchy levels. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

For brevity, these **show** command outputs include only the configuration that is relevant to this example.

```
user@MBG1# show unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-1
mobile-interface mif.0;
apn-type real;
apn-data-type ipv4;
dns-server primary 10.10.10.p secondary 172.16.0.7;
p-cscf 172.16.14.25;
```

```
session-timeout 0;
idle-timeout 0;
idle-timeout-direction both;
aaa-profile aaa-access-profile-1;
restriction-value 0;
address-assignment-method {
  aaa;
  inet-pool {
    pool pool-1;
  }
  charging {
    default-charging-profile default-charging-profile-apn-1;
  }
}
```

```
user@MBG1# show interfaces
mif {
  unit 0 {
    family intet;
  }
}
```

```
user@MBG1# show routing-instances User1-VRF interfaces
mif.0;
ge-0/0/0.5;
```

After you configure the device, enter **commit** from configuration mode.

## Verification

### Verifying the APN Configuration

**Purpose** Verify that the APN is configured or not.

**Action** From operational mode, enter the **show unified-edge ggsn-pgw apn statistics apn-name apn-1** command.

**Meaning** The APN configured (**apn-1** in this case) will display a number of statistics such as address allocation and user authentication statistics. Non-zero values in these fields are a sign that the APN is functioning.

**Related Documentation**

- Configuring APNs on the MobileNext Broadband Gateway Overview on page 111
- Configuring General APN Parameters on the Broadband Gateway on page 115
- Configuring the Restriction Value on a Broadband Gateway APN on page 119
- Configuring Anonymous Users on a Broadband Gateway APN on page 120
- Configuring Address Assignment on a Broadband Gateway APN on page 121
- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- Configuring Mobile Interfaces for APNs on page 126

- Configuring Mobile Interface to APN Associations in VRFs on page 128
- Configuring APN Service Selection on a Broadband Gateway on page 129

## Networks Behind the Mobile Device Overview

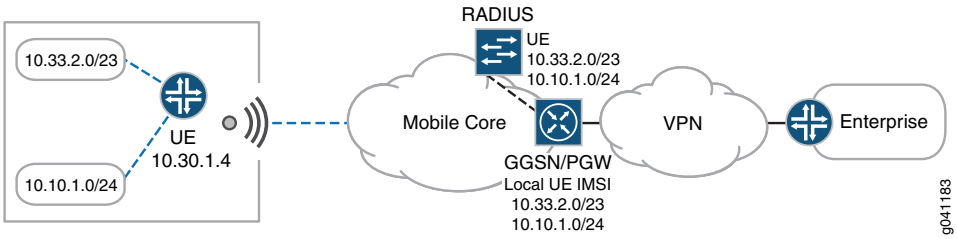
The fundamental function of a MobileNext Broadband Gateway configured as a Gateway GPRS Support Node (GGSN) or Packet Data Network Gateway (P-GW) is to provide IP connectivity and services to the mobile subscriber. In small office, home office (SOHO) environments, the mobile user equipment can act as a router, connecting to more than one IP address associated with the user equipment. If some form of Network Address Translation (NAT) is not used in the mobile equipment, the IP address associated with this "mobile router" user equipment need not necessarily be associated with the addresses of the network (or networks) behind the mobile equipment.

The broadband gateway supports typical use scenarios for networks behind the mobile equipment when the mobile device:

- Acts as a gateway for devices behind it, and these devices do not have 3G or 4G interfaces.
- Acts as a branch office customer edge (CE) router with a 3G or 4G interface to back up a primary fixed network link.

Figure 37 on page 138 shows that the IP prefixes for networks behind the mobile equipment (**10.33.2.0/23** and **10.10.1.0/24**) are not in the same IP address space as the mobile device itself (**10.33.1.4**). These addresses can be obtained locally or through a RADIUS server (both are shown in the figure).

Figure 37: Network That Is Behind the Mobile Device and the P-GW




The networks behind the mobile equipment feature is enabled at the access point name (APN) level. When a mobile subscriber establishes a session using the APN, the broadband gateway learns about the prefixes (networks) that are behind the mobile subscriber either through RADIUS (using the framed route attributes in the Access-Accept messages from the RADIUS server) or through the CLI configuration. The prefixes obtained from RADIUS take precedence over the local configuration.

These network-behind-mobile prefixes (routes) are advertised by routing protocols. The routes also populate the mobile subscriber database in the anchor packet forwarding engine and are associated with the appropriate mobile subscriber. This enables the anchor packet forwarding engine to forward the network-behind-mobile traffic using the GPRS tunneling protocol (GTP) tunnel associated with the mobile subscriber. Other

subscriber-specific features such as charging and quality of service are applied to network-behind-mobile traffic.

NOTE: **Routes from the authentication, authorization, and accounting (AAA) server override the prefixes configured for the APN.**

**Related Documentation**

- Configuring the Networks Behind the Mobile Equipment Feature on page 139
- Example: Configuring the Networks Behind the Mobile Device Feature on page 141

## Configuring the Networks Behind the Mobile Equipment Feature

The MobileNext Broadband Gateway can support a network of devices behind the mobile device. You configure the addresses for network-behind-mobile devices by associating a list of IPv4 or IPv6 prefixes with an International Mobile Subscriber Identifier (IMSI) inside an access point name (APN). You can configure a limit to the number of IPv4 or IPv6 prefixes that the anchor Packet Forwarding Engine stores.

You can configure the networks behind the mobile equipment in one of the following general ways:

- Using RADIUS—You enable the networks behind the mobile equipment feature and obtain prefixes from the RADIUS server (you must configure RADIUS separately).
- Using local configuration—You enable the networks behind the mobile equipment feature and list the prefixes locally in the CLI.

NOTE: **If you configure both RADIUS and local methods, then prefixes learned through RADIUS override those configured locally.**

Before you begin configuring the networks behind the mobile equipment feature on a broadband gateway APN, you should have done the following:

- Configured the chassis of the broadband gateway
- Configured the interfaces of the broadband gateway
- Configured the APN parameters for the specific APN

You can associate up to 32 prefixes with a mobile device. If the user equipment sets up multiple sessions to the same APN, then the network-behind-mobile prefixes apply to only the first session.

To configure the networks behind the mobile equipment feature:

1. Enable the networks behind the mobile equipment feature for the APN called **nbm-apn**.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns nbm-apn]
   user@host# set allow-network-behind-mobile
   ```

NOTE: If you intend to obtain network-behind-mobile prefixes from RADIUS, this is the only step required. You must also configure the RADIUS server.

2. For local network-behind-mobile prefixes, configure the **local** statement for address assignment for the APN called **nbm-apn**.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns nbm-apn]
user@host# set address-assignment local
```

3. For local network-behind-mobile prefixes, configure the **network-behind-mobile** statement for the APN called **nbm-apn**.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apn nbm-apn]
user@host# set network-behind-mobile
```

4. For local network-behind-mobile prefixes, configure the **imsi** statement and value of IPv4 or IPv6 prefixes associated with this mobile device.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apn nbm-apn
  network-behind-mobile]
user@host# set imsi 111222330012347 prefix-v4 20.1.1.0/24 prefix-v6
  2003:2002:21::0/48
```

NOTE: You can configure up to 32 IPv4 or IPv6 prefixes.

5. (Option) Configure the maximum number of network-behind-mobile IPv4 prefixes on the broadband gateway for each anchor Packet Forwarding Engine configured on the broadband gateway.

```
[edit unified-edge gateways ggsn-pgw MBG1]
user@host# set anchor-pfe-ipv4-nbm-prefixes 16
```

NOTE: The limit is set in thousands from 16 to 128.

6. (Option) Configure the maximum number of IPv6 prefixes on the broadband gateway for networks behind the mobile equipment of the anchor Packet Forwarding Engine.

```
[edit unified-edge gateways ggsn-pgw MBG1]
user@host# set anchor-pfe-ipv6-nbm-prefixes 32
```

NOTE: The limit is set in thousands from 16 to 128.

**Related Documentation**

- Networks Behind the Mobile Device Overview on page 138
- Example: Configuring the Networks Behind the Mobile Device Feature on page 141

## Example: Configuring the Networks Behind the Mobile Device Feature

This example shows how to configure the networks behind the mobile equipment feature for an access point name (APN) on the MobileNext Broadband Gateway. The APN assigns these addresses locally, but they can be overridden by an authentication, authorization, and accounting (AAA) server such as RADIUS. The APN, called ***nbm-apn***, is configured on mobile interface 0 (**mif.0**).



### Requirements

This example uses the following hardware and software components:

- An MX Series chassis (except the MX180) equipped with session Dense Port Concentrators (DPCs) and interface Packet Forwarding Engines (housed in DPCs or Modular Port Concentrators [MPCs]).
- The Junos OS Mobility package software

Before you begin:

- Install the chassis hardware.
- Configure the chassis, as well as interfaces, anchors, and (optionally) redundancy.
- Configure RADIUS

### Overview

In this example, the broadband gateway has only one APN configured. Few APN parameters are configured in this example, which emphasizes the networks behind the mobile equipment feature. The mobile interface is configured (**mif.0**), and then the address assignment is done locally.

In detail, the broadband gateway is named **MBG1** and the APN is called **nbm-apn**. Most general APN parameters either use the default values or are not configured.

This configuration assigns the IPv4 prefixes **192.168.27.0/24** and **192.168.48.0/24** to a mobile device with the International Mobile Subscriber Identifier (IMSI) of **111222330012347**.

### Configuration

**CLI Quick Configuration**

The networks behind the mobile equipment feature referenced above is configured by:

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns nbm-apn]
user@host# set mobile-interface mif.0
user@host# set allow-network-behind-mobile
user@host# set address-assignment local
```

```
user@host# set network-behind-mobile imsi 111222330012347 prefix-ipv4-list
  192.168.27.0/24 192.168.48.0/24
```

**Results** From configuration mode, confirm your configuration by entering the **show** command at the various hierarchy levels. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

For brevity, these **show** command outputs include only the configuration that is relevant to this example.

```
user@host# show unified-edge gateways ggsn-pgw MBG1 apn-services apns nbm-apn
allow-network-behind-mobile;
mobile-interface mif.0;
address-assignment-method {
  local;
}
network-behind-mobile {
  imsi 111222330012347 {
    192.168.27.0/24;
    192.168.48.0/24;
  }
}
```

After you configure the device, enter **commit** from configuration mode.

## Verification

### Verifying the Networks Behind the Mobile Equipment Configuration

**Purpose** Verify that a mobile subscriber is associated with the configured network-behind-mobile prefixes.

**Action** From operational mode, enter the **show unified-edge ggsn-pgw gateway MBG1 subscribers extensive** command.

**Meaning** The output associated with the IMSI (**111222330012347** in this case) displays a list of IPv4 addresses as **IPv4 NBM address** (although the prefixes are listed for the APN **nbm-apn**).

**Related Documentation**

- Networks Behind the Mobile Device Overview on page 138
- Configuring the Networks Behind the Mobile Equipment Feature on page 139

# HTTP Header Enrichment Overview

Mobile subscribers accessing Web-based services often need to have content added to the Hypertext Transport Protocol (HTTP) headers sent back and forth as part of the client-server exchange. This HTTP header enrichment is a feature that can be configured on the MobileNext Broadband Gateway for an Access Point Name (APN).

HTTP header enrichment adds information such as the Mobile Subscriber ISDN (MS-ISDN) number to HTTP headers.

For example, this feature can add the last line to this sequence of HTTP headers:

```
GET /256k.html HTTP/1.1
Host: 10.45.45.2
Accept */*
Accept-Language: en-us
Accept-Encoding: gzip, deflate
User-Agent: Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1; NET CLR 1.1.4322
name: value
X-MSISDN: <MSISDN #>
```

You configure HTTP header enrichment by installing one or more Multiservices Dense Port Concentrators (MS-DPCs) in the broadband gateway chassis, and configuring and applying a service set to the mobile interface for the configured APN. This feature maintains statistics for the flows to which it is applied.

**Related Documentation**

- Configuring HTTP Header Enrichment on page 143
- Example: Configuring HTTP Header Enrichment on page 146

## Configuring HTTP Header Enrichment

The MobileNext Broadband Gateway can support content added to the Hypertext Transport Protocol (HTTP) headers sent back and forth as part of the client-server exchange for mobile subscribers accessing Web-based services. You configure HTTP header enrichment as a service for an access point name (APN).

Before you begin configuring HTTP header enrichment for a broadband gateway APN, you should have done the following:

- Configured the chassis of the broadband gateway
- Configured the interfaces of the broadband gateway
- Configured the Packet Data Network Gateway (P-GW) parameters for the broadband gateway
- Configured the APN parameters for the specific APN

You must make sure that the **JUNOS Services HTTP Content Management package** and **JUNOS Services Mobile Subscriber Service Container package** are installed on the device. Use the **show version** command to provide a list of installed services.

If the HTTP header enrichment interface configured is in the form **ams*n***, then per-subscriber load-balancing is performed. If the HTTP header enrichment interface configured is in the form **ms*n***, then no load balancing (or redundancy) is performed. In either case, the **interface** statement at the **system** hierarchy level of the PGW is required for all subscriber-aware services because the subscriber is anchored on the service PIC interface.

To configure HTTP header enrichment for an APN, you implement and apply a typical services set and rule with **from** and **then** clauses:

NOTE: You can configure more than one match condition in the **from** clause, and more than one action in the **then** clause, but you must configure at least one for each.

1. Configure the **destination-address** statement at the **hcm** hierarchy level to define the IP address to which to apply the HTTP header extension information. In this step, the **destination-address** statement is configured as a **from** clause inside a term called ***1*** inside a **tag-rule** called ***rule1***.

   NOTE: The **term** argument must have a numeric value.

   [edit services hcm tag-rule *rule1* term *1* from]
   user@host# **set destination-address** *any-unicast*

2. Configure the **destination-address-range** and specify a low-to-high IP address range for the header enrichment.

   [edit services hcm tag-rule *rule1* term *1* from]
   user@host# **set destination-address-range** low *10.10.10.1* high *10.10.10.255/32*

3. Configure the **destination-port** number for the header extension.

   [edit services hcm tag-rule *rule1* term *1* from]
   user@host# **set destination-port** *1004*

4. Configure the **destination-port-range** number and specify a low-to-high port range for the header enrichment.

   [edit services hcm tag-rule *rule1* term *1* from]
   user@host# **set destination-port-range** low *1000* high *2000*

5. Configure the **destination-prefix-list** to reference a predefined prefix list for the header enrichment.

   [edit services hcm tag-rule *rule1* term *1* from]
   user@host# **set destination-prefix-list** *hcm-prefix-list*

6. Configure the **tag-header** statement at the **hcm** hierarchy level to determine the tag header to apply to the HTTP header. In this step, the **tag-header** statement is configured under a **tag** statement named ***msisdn*** inside a **then** clause inside ***1*** of the **tag-rule** called ***rule1***.

   [edit services hcm tag-rule *rule1* term *1* then tag *msisdn*]
   user@host# **set tag-header X_MSISDN**

7. Configure the **tag-attribute** statement at the **hcm** hierarchy level to determine the list tag attributes to apply to the HTTP header.

   [edit services hcm]
   user@host# **set tag-attribute msisdn**

NOTE: The tag attribute must be listed to be used in the tag rule.

8. Configure the **tag-attribute** statement at the **hcm** hierarchy level to determine the tag attribute to apply to the HTTP header. In this step, the **tag-attribute** statement is configured under a **tag** statement named ***msisdn*** inside a **then** clause inside ***1*** of the **tag-rule** called ***rule1***.

   [edit services hcm tag-rule *rule1* term *1* then tag *msisdn*]
   user@host# **set tag-attribute msisdn**

   NOTE: The tag attribute must be listed in the tag attributes established at the **hcm** hierarchy level.

9. Configure the **tag-separator** statement to specify a separator to use for header enrichment.

   [edit services hcm tag-rule *rule1* term *1* then tag *msisdn*]
   user@host# **set tag-separator ,**

10. Configure the **encrypt** statement to specify a hash method and prefix key to use for header enrichment.

    [edit services hcm tag-rule *rule1* term *1* then tag *msisdn*]
    user@host# **set encrypt *md5* prefix *gatewaykey1***

11. If you have more than one tag rule, create a tag rule set to group multiple configured rules.

    [edit services hcm tag-rule-set *rule-set-1*]
    user@host# **set tag-rule *rule1***
    user@host# **set tag-rule *rule2***

12. Apply the tag rule or the tag rule set to a service set. This step applies a single tag rule named *rule1*.

    [edit services service-set *service-set-1*]
    user@host# **set tag-rules *rule1***

13. Include the **subscriber-awareness** statement as a service set option for the mobile service set.

    [edit services service-set *service-set-1* service-set-options]
    user@host# **set subscriber-awareness**

14. include the **resource-triggered** statement as a load-balancing hash key option for the mobile service interface.

    [edit services service-set *service-set-1* interface-service service-interface *ams1.1*
      load-balancing-options hash-keys]
    user@host# **set resource-triggered**

15. Apply the service set to the mobile interface for the APN for input and output.

    [edit interfaces mif unit 0 family inet service]
    user@host# **set input service-set *service-set-1***
    user@host# **set output service-set *service-set-1***

16. Include the **interface** statement gateway system configuration.

    ```
    [edit unified-edge gateways ggsn-pgw MBG1 system]
    user@host# set anchor-service-pics interface ams0
    ```

    NOTE: This statement is required for all subscriber-aware services because the subscriber is anchored on the service PIC interface.

17. Include the **jservice-hcm** and **jservices-mss** packages with the services PIC configuration.

    ```
    [edit chassis fpc 3 pic 0 adaptive-services service-package extension-provider]
    user@host# set package jservices-hcm
    user@host# set package jservices-mss
    ```

**Related Documentation**

- HTTP Header Enrichment Overview on page 142
- Example: Configuring HTTP Header Enrichment on page 146

## Example: Configuring HTTP Header Enrichment

This example shows how to configure the HTTP header enrichment service on an Access Point Name (APN) on the MobileNext Broadband Gateway. The example shows not only the configuration of the service set and **hcm** stanza, but all other CLI pieces required to successfully enable this service.



### Requirements

This example uses the following hardware and software components:

- An MX240, MX480, or MX960 running the MobileNext software
- Junos OS Release 11.4W or later

Before you begin:

- Configure the chassis, along with redundancy and anchors.
- Configure the Packet Data Network Gateway (P-GW).
- Configure the APN and APN interfaces.

### Overview

This example adds a Mobile Subscriber ISDN (MS-ISDN) and International Mobile Subscriber Number (IMSI) field to the HTPP headers on all unicast destination addresses

for traffic flowing through the APN (***APN1***) on the P-GW (**MBG1**). The APN is configured to use the mobile interface **mif.0**, and the services PIC used is PIC 0 on FPC 3. The HTTP header enrichment interface configured is in the form **ams*n*** so that per-subscriber load balancing is performed.

## Configuration

**CLI Quick Configuration**

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

NOTE: This example assumes several rule, APN, and interface names, as well as other variables. If your variables are different, you must change these details.

```
set services hcm tag-rule rule1 term 1 from destination-address any-unicast
set services hcm tag-rule rule1 term 1 then tag msisdn
set services hcm tag-rule rule1 term 1 then tag msisdn tag-header msisdn
set services hcm tag-rule rule1 term 1 then tag-attribute msisdn
set services hcm tag-rule rule1 term 1 then tag imsi
set services hcm tag-rule rule1 term 1 then tag imsis tag-header imsi
set services hcm tag-rule rule1 term 1 then tag-attribute imsi

set services service-set service-set-1 tag-rules rules1
set services service-set service-set-1 interface-service service-interface ams1.1
set services service-set service-set-1 tag-rules rules1 load-balancing-options hash-keys
    resource-triggered

set interfaces mif unit 0 family inet service input service-set-1
set interfaces mif unit 0 family inet service output service-set-1

set unified-edge gateways ggsn-pgw MBG1 system anchor-services-pics interface ams0

set chassis fpc 3 pic 0 adaptive-services service-package extension-provider package
    jservices-hcm
set chassis fpc 3 pic 0 adaptive-services service-package extension-provider package
    jservices-mss
```

NOTE: Make sure you apply these statements to the correct hardware and software components.

**Step-by-Step Procedure**

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see "Using the CLI Editor in Configuration Mode" in the *Junos OS CLI User Guide*.

To configure HTTP header enrichment to add the MS-ISDN and IMSI to the HTTP header for any unicast destination address:

1. Configure the **destination-address** statement at the **hcm** hierarchy level to define the IP address to which to apply the HTTP header extension information. In this step, the **destination-address** statement is configured as a **from** clause inside a term called ***1*** inside a **tag-rule** called ***rule1***.

   [edit services hcm tag-rule *rule1* term *1* from]
   user@host# **set destination-address** *10.10.10.1/32*

2. Configure the **tag-header** statement at the **hcm** hierarchy level to determine the tag header to apply to the HTTP header. In this step, the **tag-header** statement is configured under a **tag** statement named ***msisdn*** inside a **then** clause inside ***1*** of the **tag-rule** called ***rule1***.

   [edit services hcm tag-rule *rule1* term *1* then tag *msisdn*]
   user@host# **set tag-header X_MSISDN**

3. Configure the **tag-attribute** statement at the **hcm** hierarchy level to determine the list tag attributes to apply to the HTTP header.

   [edit services hcm]
   user@host# **set tag-attribute msisdn imsi**

   NOTE: The tag attribute must be listed to be used in the tag rule.

4. Configure the **tag-attribute** statement at the **hcm** hierarchy level to determine the MS-ISDN tag attribute to apply to the HTTP header. In this step, the **tag-attribute** statement is configured under a **tag** statement named ***msisdn*** inside a **then** clause inside ***1*** of the **tag-rule** called ***rule1***.

   [edit services hcm tag-rule *rule1* term *1* then tag *msisdn*]
   user@host# **set tag-attribute msisdn**

   NOTE: The tag attribute must be listed in the tag attributes established at the hcm hierarchy level.

5. Configure the **tag-attribute** statement at the **hcm** hierarchy level to determine the IMSI tag attribute to apply to the HTTP header. In this step, the **tag-attribute** statement is configured under a **tag** statement named ***imsi*** inside a **then** clause inside ***1*** of the **tag-rule** called ***rule1***.

   [edit services hcm tag-rule *rule1* term *1* then tag *msisdn*]
   user@host# **set tag-attribute imsi**

NOTE: The tag attribute must be listed in the tag attributes established at the hcm hierarchy level.

6. Apply the tag rule or the tag rule set to a service set. This step applies a single tag rule named *rule1*.

```
[edit services service-set service-set-1]
user@host# set tag-rules rule1
```

7. Include the **subscriber-awareness** statement as a service set option for the mobile service set.

```
[edit services service-set service-set-1 service-set-options]
user@host# set subscriber-awareness
```

8. include the **resource-triggered** statement as a load-balancing hash key option for the mobile service interface.

```
[edit services service-set service-set-1 interface-service service-interface ams1.1
  load-balancing-options hash-keys]
user@host# set resource-triggered
```

9. Apply the service set to the mobile interface for the APN for input and output.

```
[edit interfaces mif unit 0 family inet service]
user@host# set input service-set service-set-1
user@host# set output service-set service-set-1
```

10. Include the **interface** statement for the P-GW.

```
[edit unified-edge gateways ggsn-pgw MBG1 system]
user@host# set anchor-service-pics interface ams0
```

11. Include the **jservice-hcm** and **jservices-mss** packages with the services PIC configuration.

```
[edit chassis fpc 3 pic 0 adaptive-services service-package extension-provider]
user@host# set package jservices-hcm
user@host# set package jservices-mss
```

12. Include the recommended aggregated multiservices PIC (**ams**) configuration for per-subscriber load balancing.

```
[edit interfaces ams0 load-balancing-options member-failure-options]
user@host# set redistribute-all-traffic enable-rejoin
user@host# set drop-member-traffic rejoin-timeout 10
```

NOTE: Although you can configure an *ms-* interface, we recommend load balancing with an *ams-* interface for HTTP header enrichment.

**Results** From configuration mode, confirm your configuration by entering the **show** command at the proper hierarchy levels. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

For brevity, these **show** command outputs include only the configuration that is relevant to this example. Any other configuration on the system is replaced with ellipses (...).

```
(...)
services {
   service-set services-set-1 {
      service-set-options {
         subscriber-awareness;
      }
      tag-rules rule1;
      interface-service {
         service-interface ams1.1;
         load-balancing-options {
            hash-keys {
               resource-triggered;
            }
         }
      }
   }
      hcm {
         tag-rule rule1 {
            term 1 {
               from {
                  destination-address {
                     any-unicast;
                  }
               }
               then {
                  tag msisdn {
                     tag-header X-MSISDN;
                     tag-attribute msisdn;
                  }
                  tag imsi {
                     tag-header X-IMSI;
                     tag-attribute imsi;
                  }
               }
            }
         }
         tag-attribute [ msisdn imsi];
      }
}
(...)
interfaces mif }
   unit 0 {
      family inet {
         service {
            input {
               service-set service-set-1;
            }
            output {
               service-set servise-set-1;
            }
         }
      }
```

```
    }
}
(...)
unified-edge gateways ggsn-pgw MBG1 system {
    anchor-services-pics {
        interface ams1;
    }
}
unified-edge gateways ggsn-pgw MBG1 apn-services {
    apns {
        APN1 {
            mobile-interface mif.0;
            (...)
        }
    }
}
(...)
chassis fpc 3 pic 0 {
    adaptive-services {
        service-package {
            extension-provider {
                control-cores 1;
                data-cores 6;
                object-cache-size 2560;
                policy-db-size 64;
                package jservices-hcm;
                package jservices-mss;
                package jservices-crypto-base;
            }
        }
    }
}
(...)
interfaces ams0 {
    load-balancing-options {
        redistribute-all-traffic {
            enable-rejoin;
        }
        drop-member-traffic {
            rejoin-timeout 10;
        }
    }
}
```

NOTE: Although you can configure HTTP header enrichment to use a non-load-balancing *ms-* service interface, we recommend configuring an *ams-* interface with load-balancing options used for HTPP header enrichment, as shown in this example. The **redistribute-all-traffic** statement removes the aggregated member from the traffic distribution list so that traffic is redistributed among active members, which affects the flow on all members of the group. The **drop-member-traffic** statement (with a high **rejoin-timeout** value) discards the traffic for a failed member until the rejoin timeout period expires. If the member recovers before this timeout period has expired, flows are again directed to the recovered member. If the member has not recovered in the timeout period, the failed member is removed from the group. Therefore, a high rejoin timeout minimizes the impact on existing members. HTTP header enrichment uses redundancy properties, but not hashing.

If you are done configuring the device, enter **commit** from configuration mode.

## Verification

### Verifying HTTP Header Enrichment

**Purpose** Verify whether HTTP header enrichment is enabled or not.

**Action** From operational mode, enter the **show services hcm statistics rule rule1** command.

**Meaning**

```
user@host: show services hcm statistics rule rule1
Interface: mams-3/1/0
Term id              Hits
1                   58
Interface: mams-4/1/0
Term id              Hits
1                   144
```

A non-zero value in the field **Hits** shows that the interfaces that are part of **ams1.1** are successfully performing HTTP header enrichment.

**Related Documentation**

- HTTP Header Enrichment Overview on page 142
- Configuring HTTP Header Enrichment on page 143

PART 4

# Authorization and Addressing Configuration

CHAPTER 7

# Configuring AAA

## Overview of AAA on the Broadband Gateway

The MobileNext Broadband Gateway supports a framework for providing authentication, authorization, and accounting (AAA) services to mobile subscribers. The broadband gateway provides authentication (verifying a subscriber's username and password), authorization (receiving information about the types of services to deliver to the subscriber), and accounting (accumulating and providing statistics about services delivered to the subscriber) using groups of external RADIUS servers.

### Authentication

The broadband gateway acts as a client to the RADIUS server when authenticating a mobile subscriber's username and password. When the broadband gateway receives a Create PDP Context Request or Create Session Request message from a mobile subscriber, it gets the subscriber's authentication information from the message, then sends an Access-Request message to the RADIUS server. The Access-Request message contains attributes such as the subscriber username, password, the ID of the client, and the port ID that the subscriber is accessing.

Once the RADIUS server receives the Access-Request message, it validates the sending client (the broadband gateway) using a shared secret. After the sending client is validated, the RADIUS server looks up the subscriber in its database. A list of requirements must be met to allow access for the subscriber. If any requirement is not met, the RADIUS server sends an Access-Reject message back to the broadband gateway, indicating that the subscriber's access request is invalid.

If the requirements are met, a list of configuration values for the subscriber is placed into an Access-Accept message response. These values include the types of services for which the subscriber is authorized, as well as all necessary values to deliver the services.

To determine a subscriber's username, the broadband gateway looks at the Protocol Configuration Options (PCO) received in the Create PDP Context Request or Create Session Request message. If the subscriber's username is included in the PCO, then that is used for authentication. If the subscriber's username cannot be determined from the PCO, then the option specified for the **user-name** parameter in the **anonymous-user** statement of the access point name (APN) configuration is used instead. This can be an actual username, the APN name, the subscriber's International Mobile Subscriber Identity (IMSI), or the subscriber's Mobile Station Integrated Services Digital Network (MSISDN) number.

To determine the subscriber's password, the broadband gateway does the following:

- For the Password Authentication Protocol (PAP), the broadband gateway looks for the password in the PCO of the Create PDP Context Request or Create Session Request

message. If the password cannot be determined from the PCO, the password specified for the **password** setting in the **anonymous-user** statement is used instead.

- For the Challenge Handshake Authentication Protocol (CHAP), TLVs for the CHAP challenge and CHAP password (concatenation of CHAP ID and CHAP password) both arrive in the PCO. The broadband gateway includes these TLVs in the Access-Request message sent to the RADIUS server.

If the RADIUS server responds with an Access-Challenge or Access-Reject message, or if no response is received from the RADIUS server, the broadband gateway does not create a session for the subscriber.

## Accounting

A PDP context configured to use RADIUS accounting causes the broadband gateway to generate an Accounting Start message at the start of service delivery. The broadband gateway sends that message to the RADIUS accounting server, which sends back an acknowledgement that the message has been received. The Accounting Start message contains RADIUS attributes describing the type of service being delivered and the subscriber to which it is being delivered. Subscriber passwords are not carried in accounting messages.

At the end of service delivery, the broadband gateway generates an Accounting Stop message describing the type of service that was delivered and statistics such as elapsed time, input/output octets, and input/output packets. It sends that message to the RADIUS accounting server, which sends back an acknowledgement that the message has been received.

During the life of a user session, some information related to the session may change. Upon reception of an Update PDP Context Request message from the Serving GPRS Support Node (SGSN), or upon reception of a Modify Bearer Request or Update Bearer Response from the Serving Gateway (S-GW), the broadband gateway sends an Accounting Request Interim-Update message to the RADIUS server to update information related to this PDP context. You can configure how often Interim-Update messages are sent, and specify which events do or do not trigger them.

## APN-Specific AAA Settings

AAA services are provided on a per-APN basis. Mobile subscribers gaining access to a given APN receive AAA services as indicated in a defined *AAA profile*. The AAA profile specifies which sets of RADIUS servers are used for authentication and accounting, how the broadband gateway handles attributes in RADIUS messages it sends and receives, as well as other parameters. You specify the name of the AAA profile to use as part of APN services configuration.

In the APN services configuration, you can also configure the broadband gateway to allow the RADIUS server to assign addresses to mobile subscribers, override the locally or DHCP-assigned address with a RADIUS-assigned address, or wait for the accounting response from the RADIUS server before sending the Create Session Response or Create PDP Context Response message to the S-GW or SGSN.

### RADIUS-Initiated Dynamic Requests

You can specify RADIUS servers that can initiate dynamic requests to the broadband gateway. Dynamic requests include change of authorization (CoA) requests, which specify attribute modifications and service changes, and Disconnect requests, which terminate subscriber sessions.

- See "Supported Attributes in Change of Authorization (CoA) Messages" on page 185 for information about RADIUS attributes and Third-Generation Partnership Project (3GPP) vendor-specific attributes (VSAs) supported in CoA requests.
- See "Supported Attributes in Disconnect Request Messages" on page 184 for information about RADIUS attributes and 3GPP VSAs supported in Disconnect requests.

### Support for RADIUS Attributes, Juniper Networks VSAs, and 3GPP VSAs

The AAA framework on the broadband gateway supports RADIUS attributes and VSAs from Juniper Networks and the 3GPP. The tables in "Supported Attributes in Access-Request Messages" on page 163 and "Supported Attributes in Access-Accept Messages" on page 167 describe how the broadband gateway processes these attributes and VSAs.

**Related Documentation**

- Configuring APNs on the MobileNext Broadband Gateway Overview on page 111
- Configuring AAA on the Broadband Gateway on page 187
- Configuring Anonymous Users on a Broadband Gateway APN on page 120
- Configuring Address Assignment on a Broadband Gateway APN on page 121
- Example: Configuring AAA on the Broadband Gateway on page 200

## Scalability and Redundancy

To accommodate the substantial amount of authentication, authorization, and accounting (AAA) traffic that can be generated in a 3G/4G mobile network, the AAA implementation on the MobileNext Broadband Gateway is optimized for scalability and redundancy, both in the way the broadband gateway distributes AAA functions to its services PICs, and in the way it sends requests to the external RADIUS servers.

### Scalability

Each session DPC installed on the broadband gateway contains two services PICs. Each services PIC runs a separate AAA instance, which serves as a Network Access Server (NAS) for mobile subscriber sessions. When a mobile subscriber session requires AAA services, its anchor Modular Port Concentrator (MPC) assigns one of the services PICs to handle interaction with the RADIUS servers for the duration of that session. By installing additional session DPCs, you can increase the number of services PICs providing NAS functionality, and thus increase the number of sessions for which the broadband gateway can provide AAA services.

Rather than use a single RADIUS server for authentication or accounting, the broadband gateway sends RADIUS requests to a load-balanced group of RADIUS severs called a *network element*. To broadcast accounting traffic to multiple network elements, you can configure *network element groups*, consisting of from one to four network elements. The broadband gateway sends accounting messages to one of the network elements in the group, or can broadcast them to all of the network elements in the group.

### Redundancy

Services PICs can be configured in redundant pairs, with one services PIC active and the other standby. In this kind of configuration, the active services PIC synchronizes its pending requests with the backup services PIC. When a switchover occurs, any pending requests are then sent from the new active services PIC.

The broadband gateway can detect when RADIUS servers in a network element have failed. When the broadband gateway detects a dead server, it automatically starts sending RADIUS requests to a different server in the network element. You can set a priority level for individual RADIUS servers in the network element, so that the AAA traffic fails over to a selected server.

**Related Documentation**

- MobileNext Broadband Gateway Chassis Overview on page 60
- Broadband Gateway Redundancy Overview on page 70
- Network Elements on page 159
- Network Element Groups on page 160

## Network Elements

A network element is a load-balanced group of RADIUS servers that provides authentication, authorization, and accounting (AAA) services for mobile subscribers accessing an access point name (APN).

When a mobile subscriber attempts to get access to an APN, the broadband gateway sends an Access-Request message to one of the RADIUS servers in the network element the APN is configured to use for authentication. Similarly, accounting messages for the mobile subscriber go to the network element the APN is configured to use for accounting.

Network elements for authentication and accounting are specified in the AAA profile that is applied to the APN.

### Load Balancing Within Network Elements

To facilitate the large number of mobile subscriber sessions requiring AAA services, the broadband gateway distributes the RADIUS messages across the servers in the network element, using one of the following load-balancing algorithms:

- Direct (default)—Causes all requests to go to the first server listed in the network element configuration; if that server cannot handle additional requests, they go to the next server in the list.

- Round-robin—Sends the first request to the first server listed in the network element configuration, the second request to the second server in the list, and so on.

### Server Priority

Within a network element, a RADIUS server can be assigned a priority of 1 or 2. The broadband gateway distributes RADIUS messages only to the priority 1 servers, using the configured load-balancing algorithm. If all the priority 1 servers should fail, then the broadband gateway starts using the priority 2 servers.

### Dead Server Detection

To determine whether a RADIUS server in a network element has failed, the broadband gateway keeps track of how often requests sent to a server time out and must be retransmitted. If requests need to be retransmitted a given number of times over a given interval, the broadband gateway marks the server as "dead," then starts sending requests to the next available server in the network element (to a priority 1 server if one is available, or a priority 2 server if no priority 1 servers are available).

At the same time, the broadband gateway starts a timer (the *revert-interval*) for the server. After this timer expires, the broadband gateway marks the dead server alive again, and once again includes it in the rotation for sending RADIUS messages.

### Maximum Pending Requests for a Network Element

You can specify the maximum number of requests that can be queued to the network element. When the pending request queue is full, any additional requests are dropped. If the number of pending requests reaches 80 percent of the maximum, an SNMP trap is generated.

**Related Documentation**

- AAA Profiles on page 161
- Configuring Network Elements on page 190
- Network Element Groups on page 160

## Network Element Groups

A network element group is a list of between one and four network elements to which the MobileNext Broadband Gateway sends accounting messages.

You can configure the following options for a network element group:

- **mandatory**—Indicates that a response is mandatory from a specified network element before any services can be provided to the subscriber.
- **broadcast**—Broadcasts the accounting messages to all network elements in the group.

When the **broadcast** parameter is configured, the accounting requests are sent to all of the network elements in the network element group. Note that when the **broadcast** parameter is configured, at least one of the network elements in the group must be configured with the **mandatory** parameter. If the **broadcast** parameter is not specified,

then the broadband gateway sends the accounting requests to the first network element in the group. If there is no response, then it tries the next network element in the group, and so on.

**Related Documentation**

- AAA Profiles on page 161
- Configuring Network Elements on page 190
- Configuring Network Element Groups on page 191

## AAA Profiles

An authentication, authorization, and accounting (AAA) profile is a collection of authentication, accounting, and RADIUS attribute settings that can be applied to an access point name (APN). When mobile subscribers access the APN to which an AAA profile is applied, they receive authentication and accounting services as specified in the AAA profile.

The following sections describe the settings that can be configured in an AAA profile.

### Authentication Options

In the AAA profile, you specify a network element (load-balanced RADIUS server group) to be used for authenticating mobile subscribers.

### Accounting Options

In an AAA profile, you can specify the following options for RADIUS accounting:

- The name of the network element or network element group to use for RADIUS accounting.
- Whether the broadband gateway sends an Accounting-On message when a services PIC is restarted.
- How often the broadband gateway sends Interim-Update messages for accounting. The broadband gateway can send Interim-Update messages at specified intervals and when specific trigger events occur.

  By default, the broadband gateway sends Interim-Update messages for the following trigger events:

  - The IPv4 address update for the mobile subscriber is deferred.
  - The Mobile Station (MS) time zone changes.
  - The Public Land Mobile Network (PLMN) to which the mobile subscriber is attached changes.
  - The quality of service (QoS) profile applied by the broadband gateway for the Packet Data Protocol (PDP) context or Evolved Packet System (EPS) bearer changes.
  - The Radio Access Technology (RAT) serving the mobile subscriber changes.

- The SGSN/S-GW serving the mobile subscriber changes.
- The location information for the mobile subscriber changes.

You can optionally disable sending of Interim Update messages for any of these trigger events.

## RADIUS Attributes to Ignore or Exclude

The AAA profile can specify which RADIUS attributes the broadband gateway ignores in Access-Accept messages it receives, as well as which RADIUS attributes the broadband gateway excludes from specific types of RADIUS messages it generates.

## RADIUS Options

In an AAA profile, you can set the following options for RADIUS attributes:

- NAS-IP-Address (RADIUS attribute 4)

  This attribute specifies the IP address of the network access server (NAS) that is requesting authentication for the mobile subscriber. By default, this attribute contains the IP address configured for the RADIUS **source-interface** statement. When you specify a value for the nas-ip-address option in the AAA profile, the broadband gateway uses this IP address as the value for the NAS-IP-Address attribute in RADIUS requests.

- Prefix for NAS-Identifier (RADIUS attribute 32)

  The NAS-Identifier attribute is a string that identifies the NAS that originated the Access-Request message for the AAA session. On the broadband gateway, the anchor Modular Port Concentrator (MPC) selects a services PIC to handle AAA operations for the duration of the session. The services PIC functions as the NAS for the AAA session.

  Specifying a value for the nas-identifier-prefix option in the AAA profile configures the broadband gateway to include the NAS-Identifier attribute in RADIUS requests. In this case, the broadband gateway appends the ID of the services PIC to the value specified for the nas-identifier-prefix option, and uses the combined prefix and services PIC ID as the value for the NAS-Identifier attribute. If the services PICs are part of a redundancy group, the broadband gateway appends the aggregated multiservices interface (ams) ID to the prefix instead of the services PIC ID.

- NAS-Port-Type (RADIUS Attribute 61)

  This attribute indicates the type of port used for authenticating the mobile subscriber. In an AAA profile, you can specify a port type of *virtual* or *wireless* for the nas-port-type option. If you specify a value for the nas-port-type option, the broadband gateway uses this as the value for the NAS-Port-Type attribute in RADIUS requests.

**Related Documentation**

- Configuring an AAA Profile on page 192
- Configuring Network Elements on page 190
- Configuring Network Element Groups on page 191

## Supported Attributes in Access-Request Messages

The following tables indicate how the MobileNext Broadband Gateway processes RADIUS attributes and 3GPP VSAs in RADIUS Access-Request messages. An Access-Request message is sent by the broadband gateway to the RADIUS server to convey username, password, and other information to be used for authenticating a user.



### RADIUS IETF Attributes Supported in Access-Request Messages

Table 17 on page 163 lists the RADIUS attributes supported by the broadband gateway in Access-Request messages.

**Table 17: RADIUS IETF Attributes Supported in Access-Request Messages**

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 1 | User-Name | The username is provided to the broadband gateway by the user in the Protocol Configuration Options (PCO) received during the IP-CAN session establishment procedure.<br><br>If the PPP PDP type is used, it is provided to the broadband gateway by the user during the PPP authentication phase.<br><br>If no username is available, then the option specified for the **user-name** parameter in the **anonymous-user** statement of the APN configuration is used instead. | String |
| 2 | User-Password | If Password Authentication Protocol (PAP) is used, the user password is provided to the broadband gateway by the user in the PCO received during the IP-CAN session establishment procedure.<br><br>If the PPP PDP type is used, it is provided to the broadband gateway by the user during the PPP authentication phase.<br><br>If no user password is available, then the password specified for the **password** parameter in the **anonymous-user** statement of the APN configuration is used instead. | String |

Table 17: RADIUS IETF Attributes Supported in Access-Request Messages *(continued)*

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 3 | CHAP-Password | If Challenge Handshake Authentication Protocol (CHAP) is used, the password provided by the user (extracted from the PCO field of the Create PDP Context Request message) or PPP authentication phase (if the PPP PDP type is used). | String (can have two contiguous, with 0x00 in between) |
| 4 | NAS-IP-Address | IPv4 address of the broadband gateway for communication with the RADIUS server. | IPv4 address |
| 6 | Service-Type | Type of service the user has requested or the type of service to be provided. | 2 (Framed) |
| 7 | Framed-Protocol | Type of protocol for the user. | 7 (GPRS PDP context) |
| 8 | Framed-IP-Address | IPv4 address allocated for this user | IPv4 address |
| 9 | Framed-IP-Netmask | Network mask allocated for this user's IP address. | IPv4 netmask |
| 30 | Called-Station-Id | Identifier for the target network (APN). | APN (UTF-8 encoded characters) |
| 31 | Calling-Station-ID | Identifier for the mobile station (MS), configurable on a per-APN basis. | MSISDN in international format, UTF-8 encoded decimal characters |
| 32 | NAS-Identifier | Identifier of the NAS originating the request, may be configured as a user-specified prefix and the ID of the services PIC handling NAS functions for the session. | String |
| 44 | Acct-Session-ID | User Session identifier, unique for every bearer under the session. | Broadband gateway Gn IP address (IPv4 or IPv6) and Charging-ID, concatenated in a UTF-8-encoded hexadecimal value |
| 60 | CHAP-Challenge | The CHAP Challenge is provided to the broadband gateway by the user in the PCO received during the IP-CAN session establishment procedure.<br><br>If the PPP PDP type is used, it is provided to the broadband gateway by the user during the PPP authentication phase. | String |

Table 17: RADIUS IETF Attributes Supported in Access-Request Messages *(continued)*

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 61 | NAS-Port-Type | Type of physical port the broadband gateway is using to authenticate the user, may be configured on the broadband gateway as virtual or wireless | Integer value indicating the port type (wireless or virtual) as specified in RFC 2865 |
| 97 | Framed-IPv6-Prefix | IPv6 prefix that is configured for the user, can be used as a hint by the NAS to the RADIUS server that it would prefer this prefix. | Value indicating the prefix, as specified in RFC 3162 |

## 3GPP VSAs Supported in Access-Request Messages

Table 18 on page 165 lists the 3GPP vendor-specific attributes (VSAs) supported by the broadband gateway in Access-Request messages.

Table 18: 3GPP VSAs Supported in Access-Request Messages

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 26/10415/1 (3GPP type 1) | 3GPP-IMSI | IMSI for this user. | UTF-8 encoded string |
| 26/10415/2 | 3GPP-Charging-Id | Charging ID for this PDP context/EPS bearer. | Integer |
| 26/10415/3 | 3GPP-PDP Type | For a GGSN, this indicates the type of PDP context; for example, IP or PPP.<br><br>For a P-GW, this indicates the PDN type: IPv4, IPv6, or IPv4v6. | Integer |
| 26/10415/4 | 3GPP-CG-Address | Charging gateway IP address. | IPv4 address, or 0.0.0.0 if no charging gateway is configured on the broadband gateway. |
| 26/10415/5 | 3GPP-GPRS-Negotiated-QoS-Profile | QoS profile applied by the broadband gateway for the PDP context/EPS bearer. | UTF-8 encoded string |

Table 18: 3GPP VSAs Supported in Access-Request Messages *(continued)*

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 26/10415/6 | 3GPP-SGSN-Address | For a GGSN, this represents the SGSN IPv4 address that is used by the GTP control plane for the handling of control messages.<br><br>For a P-GW, this represents the IPv4 address of the S-GW, trusted non-3GPP IP access or ePDG that is used on S5/S8, S2a or S2b for the handling of control messages.<br><br>This attribute may be used to identify the PLMN to which the user is attached. | IPv4 address |
| 26/10415/7 | 3GPP-GGSN-Address | For a GGSN, this represents the GGSN IPv4 address that is used by the GTP control plane for the context establishment.<br><br>For a P-GW, this represents the P-GW IPv4 address that is used on the S5/S8, S2a, S2b or S2c control plane for the IP-CAN session establishment.<br><br>The address is the same as the GGSN/P-GW IPv4 address used in the CDRs generated by the broadband gateway. | IPv4 address |
| 26/10415/8 | 3GPP-IMSI-MCC-MNC | The MCC and MNC extracted from the user's IMSI (first 5 or 6 digits, as applicable from the presented IMSI). | String |
| 26/10415/9 | 3GPP-GGSN- MCC-MNC | The MCC and MNC of the network to which the broadband gateway belongs. | String |
| 26/10415/10 | 3GPP-NSAPI | Identifier for a particular PDP context for the associated PDN and MSISDN/IMSI, from creation to deletion.<br><br>For a P-GW, this identifies the EPS bearer ID if it is known to the P-GW. | String |
| 26/10415/12 | 3GPP- Selection-Mode | Selection mode for this PDP context/EPS bearer, received in the Create PDP Context/Session Request message. | String |

Table 18: 3GPP VSAs Supported in Access-Request Messages *(continued)*

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 26/10415/13 | 3GPP-Charging-Characteristics | For a GGSN, this contains the charging characteristics for this PDP context, received in the Create PDP Context Request message (only available in R99 and later releases).<br><br>For a P-GW, this contains the charging characteristics for the IP-CAN bearer. | String |
| 26/10415/18 | 3GPP-SGSN-MCC-MNC | The MCC and MNC extracted from the RAI from the Create PDP Context Request and Update PDP Context Request messages. | String |
| 26/10415/20 | 3GPP-IMEISV | International Mobile Station Equipment Identity and Software Version Number (IMEISV). | String (UTF-8 encoded characters) |
| 26/10415/21 | 3GPP-RAT-Type | The Radio Access Technology type that is currently serving the user equipment. | Octet string |
| 26/10415/22 | 3GPP-User-Location-Info | Information about where the user equipment is currently located (for example, SAI or CGI). | Octet string |
| 26/10415/23 | 3GPP-MS-TimeZone | The offset between UTC and local time in steps of 15 minutes of where the MS currently resides. | Octet string |
| 26/10415/26 | 3GPP-Negotiated-DSCP | DSCP used to mark the IP packets of this PDP context on the Gi interface, or EPS bearer context on the SGi interface. | Octet string |
| 26/10415/27 | 3GPP-Allocate-IP-Type | Indicates whether the Access-Request message is sent for user authentication only, or for allocation of IPv4 or IPv6 addresses, or both. | Octet string |

## Supported Attributes in Access-Accept Messages

The following tables indicate how the MobileNext Broadband Gateway processes RADIUS attributes or 3GPP and Juniper Networks VSAs received in RADIUS Access-Accept messages. If authentication is successful, the RADIUS server sends an Access-Accept

message that provides specific configuration information necessary to begin delivery of service to the user.



## RADIUS IETF Attributes Supported in Access-Accept Messages

Table 19 on page 168 lists the RADIUS attributes supported by the broadband gateway in Access-Accept messages.

### Table 19: RADIUS IETF Attributes Supported in Access-Accept Messages

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 1 | User-Name | The username received in the Access-Request message, or a substitute username provided by the RADIUS server.<br><br>If a value for the User-Name attribute is received in the Access-Accept message, it takes precedence over any other value for the username. | String |
| 6 | Service-Type | Type of service the user has requested or the type of service to be provided. | Value indicating the service type, as specified in RFC 2865 |
| 7 | Framed-Protocol | Type of protocol for the user. | Value indicating the protocol, as specified in RFC 2865 |
| 8 | Framed-IP-Address | IPv4 address allocated for this user, if the RADIUS server is used to allocate IP addresses. | IPv4 address |
| 9 | Framed-IP-Netmask | Network mask allocated for this user's IP address, if applicable. | IPv4 netmask |
| 25 | Class | Unmodified identifier to be used in all subsequent accounting messages. | String |
| 27 | Session-Timeout | Maximum number of seconds of service to be provided to the user before termination of the session or prompt. | 32-bit unsigned integer |
| 28 | Idle-Timeout | Maximum number of consecutive seconds of idle connection allowed to the user before termination of the session or prompt. | 32-bit unsigned integer |

Table 19: RADIUS IETF Attributes Supported in Access-Accept Messages *(continued)*

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 85 | Acct-Interim-Interval | Number of seconds between each accounting interim update to be sent from the NAS for this session. | Integer |
| 88 | Framed-Pool | Name of an assigned address pool to be used to assign an address for the user. | String |
| 96 | Framed-Interface-Id | IPv6 interface identifier to be configured for the user. | 8-octet ID |
| 97 | Framed-IPv6-Prefix | IPv6 prefix and corresponding route to be configured for the user. | Value indicating the prefix, as specified in RFC 3162 |
| 100 | Framed-IPv6-Pool | Name of the assigned pool to be used to assign an IPv6 prefix for the user. | String |
| 123 | Delegated-IPv6-Prefix | IPv6 prefix to be used. | Value indicating the prefix, as specified in RFC 4818 |
| 26/311 | MS- primary-DNS-server | Primary DNS server address for this APN. | IPv4 address |
| 26/311 | MS-Secondary-DNS-Server | Secondary DNS server address for this APN. | IPv4 address |
| 26/311 | MS-Primary-NBNS-Server | Primary NetBios name server address for this APN. | IPv4 address |
| 26/311 | MS-Secondary-NBNS-Server | Secondary NetBios name server address for this APN. | IPv4 address |

## 3GPP VSAs Supported in Access-Accept Messages

Table 21 on page 170 lists the 3GPP vendor-specific attributes (VSAs) supported by the broadband gateway in Access-Accept messages.

Table 20: 3GPP VSAs Supported in Access-Accept Messages

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 26/10415/5 | 3GPP-GPRS-Negotiated-QoS-Profile | QoS profile applied by the broadband gateway for the PDP context/EPS bearer. | UTF-8 encoded string |

Table 20: 3GPP VSAs Supported in Access-Accept Messages *(continued)*

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 26/10415/13 | 3GPP-Charging-Characteristics | For a GGSN, this contains the charging characteristics for this PDP context, received in the Create PDP Context Request message (only available in R99 and later releases).<br><br>For a P-GW, this contains the charging characteristics for the IP-CAN bearer. | String |
| 26/10415/17 | 3GPP-IPv6-DNS-Servers | List of IPv6 addresses of DNS servers for this APN. | IPv6 addresses |

### Juniper Networks VSAs Supported in Access-Accept Messages

Table 21 on page 170 lists the Juniper Networks VSAs supported by the broadband gateway in Access-Accept messages.

Table 21: Juniper VSAs Supported in Access-Accept Messages

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 26-JNPR-2 | Local-Address-Pool | Name of the IP address pool configured on the broadband gateway to be used for address allocation for this PDP context. | String |
| 26-JNPR-162 | Redirect-Gw-Addr | Address of the gateway to which the user session should be redirected. | IPv4 address |
| 26-JNPR-163 | APN-Name | Name of the APN. | String |

## Supported Attributes in Accounting Start Messages

The following tables indicate how the MobileNext Broadband Gateway processes RADIUS attributes and 3GPP VSAs in RADIUS Accounting Start messages. An Accounting Start message indicates to the RADIUS server that the user session has started, and specifies QoS parameters associated with the session.



### RADIUS IETF Attributes Supported in Accounting Start Messages

Table 22 on page 171 lists the RADIUS attributes supported by the broadband gateway in Accounting Start messages.

Table 22: RADIUS IETF Attributes Supported in Accounting Start Messages

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 1 | User-Name | The username provided to the broadband gateway by the user in the Protocol Configuration Options (PCO) received during the IP-CAN session establishment procedure.<br><br>If the PPP PDP type is used, it is provided to the broadband gateway by the user during the PPP authentication phase.<br><br>If no username is available, then the option specified for the **user-name** parameter in the **anonymous-user** statement of the APN configuration is used instead.<br><br>If a value for the User-Name attribute was received in the Access-Accept message, it takes precedence over any other value for the username. | String |
| 4 | NAS-IP-Address | IPv4 address of the broadband gateway for communication with the RADIUS server. | IPv4 address |
| 6 | Service-Type | Type of service the user has requested or the type of service to be provided. | Value indicating the service type, as specified in RFC 2865 |
| 7 | Framed-Protocol | Type of protocol for the user. | Value indicating the protocol, as specified in RFC 2865 |
| 25 | Class | Unmodified identifier received in the Access-Accept message. | String |
| 30 | Called-Station-Id | Identifier for the target network (APN). | APN (UTF-8 encoded characters) |
| 31 | Calling-Station-ID | Identifier for the mobile station (MS), configurable on a per-APN basis. | MSISDN in international format, UTF-8 encoded decimal characters |
| 32 | NAS-Identifier | Identifier of the NAS originating the request. | String |
| 40 | Acct-Status-Type | Type of accounting message. | Integer |
| 41 | Acct-Delay-Time | Number of seconds the broadband gateway has been trying to send this accounting record. | 32-bit unsigned integer |

Table 22: RADIUS IETF Attributes Supported in Accounting Start Messages *(continued)*

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 44 | Acct-Session-ID | User Session identifier, unique for every bearer under the session. | Broadband gateway Gn IP address (IPv4 or IPv6) and Charging-ID, concatenated in a UTF-8-encoded hexadecimal value |
| 45 | Acct-Authentic | Method by which user was authenticated: whether by RADIUS, the NAS itself, or another remote authentication protocol. | 1 - RADIUS<br>2 - Local<br>3 - Remote |
| 55 | Event-Timestamp | Time that this event occurred on the NAS, in seconds, since January 1, 1970 00:00 UTC. | 32-bit unsigned integer |
| 61 | NAS-Port-Type | Type of physical port the broadband gateway is using to authenticate the user, may be configured on the broadband gateway as virtual or wireless. | Value indicating the port type, as specified in RFC 2865 |

## 3GPP VSAs Supported in Accounting Start Messages

Table 23 on page 172 lists the 3GPP vendor-specific attributes (VSAs) supported by the broadband gateway in Accounting Start messages.

Table 23: 3GPP VSAs Supported in Accounting Start Messages

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 26/10415/1 (3GPP type 1) | 3GPP-IMSI | IMSI for this user. | String |
| 26/10415/2 | 3GPP-Charging-Id | Charging ID for this PDP context/EPS bearer. | String |
| 26/10415/3 | 3GPP-PDP Type | For a GGSN, this indicates the type of PDP context; for example, IP or PPP.<br><br>For a P-GW, this indicates the PDN type: IPv4, IPv6, or IPv4v6. | String |
| 26/10415/5 | 3GPP-GPRS-Negotiated-QoS-Profile | QoS profile applied by the broadband gateway for the PDP context/EPS bearer | UTF-8 encoded string |

Table 23: 3GPP VSAs Supported in Accounting Start Messages *(continued)*

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 26/10415/6 | 3GPP-SGSN-Address | For a GGSN, this represents the SGSN IPv4 address that is used by the GTP control plane for the handling of control messages.<br><br>For a P-GW, this represents the IPv4 address of the S-GW, trusted non-3GPP IP access or ePDG that is used on S5/S8, S2a or S2b for the handling of control messages.<br><br>This attribute may be used to identify the PLMN to which the user is attached. | IPv4 address |
| 26/10415/7 | 3GPP-GGSN-Address | For a GGSN, this represents the GGSN IPv4 address that is used by the GTP control plane for the context establishment.<br><br>For a P-GW, this represents the P-GW IPv4 address that is used on the S5/S8, S2a, S2b or S2c control plane for the IP-CAN session establishment.<br><br>The address is the same as the GGSN/P-GW IPv4 address used in the CDRs generated by the broadband gateway. | IPv4 address |
| 26/10415/8 | 3GPP-IMSI-MCC-MNC | The MCC and MNC extracted from the user's IMSI (first 5 or 6 digits, as applicable from the presented IMSI). | String |
| 26/10415/9 | 3GPP-GGSN-MCC-MNC | The MCC and MNC of the network to which the broadband gateway belongs. | String |
| 26/10415/10 | 3GPP-NSAPI | Identifier for a particular PDP context for the associated PDN and MSISDN/IMSI, from creation to deletion.<br><br>For a P-GW, this identifies the EPS bearer ID if it is known to the P-GW. | String |
| 26/10415/12 | 3GPP-Selection-Mode | Selection mode for this PDP context/EPS bearer, received in the Create PDP Context/Session Request message. | String |

Table 23: 3GPP VSAs Supported in Accounting Start Messages *(continued)*

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 26/10415/13 | 3GPP-Charging-Characteristics | For a GGSN, this contains the charging characteristics for this PDP context, received in the Create PDP Context Request message (only available in R99 and later releases).<br><br>For a P-GW, this contains the charging characteristics for the IP-CAN bearer. | String |
| 26/10415/18 | 3GPP-SGSN-MCC-MNC | The MCC and MNC extracted from the RAI from the Create PDP Context Request and Update PDP Context Request messages. | String |
| 26/10415/20 | 3GPP-IMEISV | International Mobile Station Equipment Identity and Software Version Number (IMEISV) | String (UTF-8 encoded characters) |
| 26/10415/21 | 3GPP-RAT-Type | The Radio Access Technology type that is currently serving the user equipment. | Integer |
| 26/10415/22 | 3GPP-User-Location-Info | Information about where the user equipment is currently located (for example, SAI or CGI). | Octet string |
| 26/10415/23 | 3GPP-MS-TimeZone | The offset between UTC and local time in steps of 15 minutes of where the MS currently resides. | Octet string |

## Supported Attributes in Accounting Interim Update Messages

The following tables indicate how the MobileNext Broadband Gateway processes RADIUS attributes and 3GPP VSAs in RADIUS accounting Interim-Update messages. An accounting Interim-Update message is sent by the broadband gateway when it receives an Update PDP Context Request message from the SGSN. It is used to update information related to the PDP context.


- RADIUS IETF Attributes Supported in Interim-Update Messages on page 174
- 3GPP VSAs Supported in Interim-Update Messages on page 176


### RADIUS IETF Attributes Supported in Interim-Update Messages

Table 24 on page 175 lists the RADIUS attributes supported by the broadband gateway in Interim-Update messages.

Table 24: RADIUS IETF Attributes Supported in Accounting Interim-Update Messages

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 1 | User-Name | The username provided to the broadband gateway by the user in the Protocol Configuration Options (PCO) received during the IP-CAN session establishment procedure.<br><br>If the PPP PDP type is used, it is provided to the broadband gateway by the user during the PPP authentication phase.<br><br>If no username is available, then the option specified for the **user-name** parameter in the **anonymous-user** statement of the APN configuration is used instead.<br><br>If a value for the User-Name attribute was received in the Access-Accept message, it takes precedence over any other value for the username. | String |
| 4 | NAS-IP-Address | IPv4 address of the broadband gateway for communication with the RADIUS server. | IPv4 address |
| 6 | Service-Type | Type of service the user has requested or the type of service to be provided. | Value indicating the service type, as specified in RFC 2865 |
| 7 | Framed-Protocol | Type of protocol for the user. | Value indicating the protocol, as specified in RFC 2865 |
| 25 | Class | Unmodified identifier received in the Access-Accept message. | String |
| 30 | Called-Station-Id | Identifier for the target network (APN). | APN (UTF-8 encoded characters) |
| 31 | Calling-Station-ID | Identifier for the mobile station (MS), configurable on a per-APN basis. | MSISDN in international format, UTF-8 encoded decimal characters |
| 32 | NAS-Identifier | Identifier of the NAS originating the request. | String |
| 40 | Acct-Status-Type | Type of accounting message. | Integer |
| 41 | Acct-Delay-Time | Number of seconds the broadband gateway has been trying to send this accounting record. | 32-bit unsigned integer |

Table 24: RADIUS IETF Attributes Supported in Accounting Interim-Update Messages *(continued)*

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 42 | Acct-Input-Octets | Number of octets sent by the user for the IP-CAN bearer | 32-bit unsigned integer |
| 43 | Acct-Output-Octets | Number of octets received by the user for the IP-CAN bearer | 32-bit unsigned integer |
| 44 | Acct-Session-ID | User Session identifier, unique for every bearer under the session. | Broadband gateway Gn IP address (IPv4 or IPv6) and Charging-ID, concatenated in a UTF-8-encoded hexadecimal value |
| 45 | Acct-Authentic | Method by which the user was authenticated: whether by RADIUS, the NAS itself, or another remote authentication protocol. | Integer:<br>1 - RADIUS<br>2 - Local<br>3 - Remote |
| 46 | Acct-Session-Time | Duration of the session, in seconds. | Integer |
| 47 | Acct-Input-Packets | Number of packets sent by the user. | Integer |
| 48 | Acct-Output-Packets | Number of packets received by the user. | Integer |
| 52 | Acct-Input-Gigawords | How many times the Acct-Input-Octets counter has wrapped around 2^32 over the course of this PDP session. | 32-bit unsigned integer |
| 53 | Acct-Output-Gigawords | How many times the Acct-Output-Octets counter has wrapped around 2^32 over the course of this PDP session. | 32-bit unsigned integer |
| 55 | Event-Timestamp | Time that this event occurred on the NAS, in seconds, since January 1, 1970 00:00 UTC. | 32-bit unsigned integer |
| 123 | Delegated-IPv6-Prefix | IPv6 prefix to be used. | Value indicating the prefix, as specified in RFC 4818 |

## 3GPP VSAs Supported in Interim-Update Messages

Table 25 on page 177 lists the 3GPP vendor-specific attributes (VSAs) supported by the broadband gateway in Interim-Update messages.

Table 25: 3GPP VSAs Supported in Accounting Interim-Update Messages

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 26/10415/1 (3GPP type 1) | 3GPP-IMSI | IMSI for this user. | String |
| 26/10415/2 | 3GPP-Charging-Id | Charging ID for this PDP context/EPS bearer. | String |
| 26/10415/3 | 3GPP-PDP Type | For a GGSN, this indicates the type of PDP context; for example, IP or PPP.<br><br>For a P-GW, this indicates the PDN type: IPv4, IPv6, or IPv4v6. | String |
| 26/10415/4 | 3GPP-CG-Address | Charging gateway IP address. | IPv4 address, or 0.0.0.0 if no charging gateway is configured on the broadband gateway |
| 26/10415/5 | 3GPP-GPRS-Negotiated-QoS-Profile | QoS profile applied by the broadband gateway for the PDP context/EPS bearer. | UTF-8 encoded string |
| 26/10415/6 | 3GPP-SGSN-Address | For a GGSN, this represents the SGSN IPv4 address that is used by the GTP control plane for the handling of control messages.<br><br>For a P-GW, this represents the IPv4 address of the S-GW, trusted non-3GPP IP access or ePDG that is used on S5/S8, S2a or S2b for the handling of control messages.<br><br>This attribute may be used to identify the PLMN to which the user is attached. | IPv4 address |
| 26/10415/7 | 3GPP-GGSN-Address | For a GGSN, this represents the GGSN IPv4 address that is used by the GTP control plane for the context establishment.<br><br>For a P-GW, this represents the P-GW IPv4 address that is used on the S5/S8, S2a, S2b or S2c control plane for the IP-CAN session establishment.<br><br>The address is the same as the GGSN/P-GW IPv4 address used in the CDRs generated by the broadband gateway. | IPv4 address |

Table 25: 3GPP VSAs Supported in Accounting Interim-Update Messages *(continued)*

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 26/10415/8 | 3GPP-IMSI-MCC-MNC | The MCC and MNC extracted from the user's IMSI (first 5 or 6 digits, as applicable from the presented IMSI). | String |
| 26/10415/9 | 3GPP-GGSN-MCC-MNC | The MCC and MNC of the network to which the broadband gateway belongs. | String |
| 26/10415/10 | 3GPP-NSAPI | Identifier for a particular PDP context for the associated PDN and MSISDN/IMSI, from creation to deletion.<br><br>For a P-GW, this identifies the EPS bearer ID if it is known to the P-GW. | String |
| 26/10415/12 | 3GPP-Selection-Mode | Selection mode for this PDP context/EPS bearer, received in the Create PDP Context/Session Request message. | String |
| 26/10415/13 | 3GPP-Charging-Characteristics | For a GGSN, this contains the charging characteristics for this PDP context, received in the Create PDP Context Request message (only available in R99 and later releases).<br><br>For a P-GW, this contains the charging characteristics for the IP-CAN bearer. | String |
| 26/10415/18 | 3GPP-SGSN-MCC-MNC | The MCC and MNC extracted from the RAI from the Create PDP Context Request and Update PDP Context Request messages. | String |
| 26/10415/21 | 3GPP-RAT-Type | The Radio Access Technology type that is currently serving the user equipment. | Integer |
| 26/10415/22 | 3GPP-User-Location-Info | Information about where the user equipment is currently located (for example, SAI or CGI). | Octet string |
| 26/10415/23 | 3GPP-MS-TimeZone | The offset between UTC and local time in steps of 15 minutes of where the MS currently resides. | Octet string |

## Supported Attributes in Accounting Stop Messages

The following tables indicate how the MobileNext Broadband Gateway processes RADIUS attributes and 3GPP VSAs in RADIUS Accounting Stop messages. An Accounting Stop message is sent by the broadband gateway when it receives a Delete PDP Context Request message (provided a RADIUS Accounting Start message had been sent previously). It indicates the termination of this particular user session.



### RADIUS IETF Attributes Supported in Accounting Stop Messages

Table 26 on page 179 lists the RADIUS attributes supported by the broadband gateway in Accounting Stop messages.

**Table 26: RADIUS IETF Attributes Supported in Accounting Stop Messages**

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 1 | User-Name | The username provided to the broadband gateway by the user in the Protocol Configuration Options (PCO) received during the IP-CAN session establishment procedure.<br><br>If the PPP PDP type is used, it is provided to the broadband gateway by the user during the PPP authentication phase.<br><br>If no username is available, then the option specified for the **user-name** parameter in the **anonymous-user** statement of the APN configuration is used instead.<br><br>If a value for the User-Name attribute was received in the Access-Accept message, it takes precedence over any other value for the username. | String |
| 4 | NAS-IP-Address | IPv4 address of the broadband gateway for communication with the RADIUS server. | IPv4 address |
| 6 | Service-Type | Type of service the user has requested or the type of service to be provided. | Value indicating the service type, as specified in RFC 2865 |
| 7 | Framed-Protocol | Type of protocol for the user. | Value indicating the protocol, as specified in RFC 2865 |

Table 26: RADIUS IETF Attributes Supported in Accounting Stop Messages *(continued)*

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 25 | Class | Unmodified identifier received in the Access-Accept message. | String |
| 30 | Called-Station-Id | Identifier for the target network (APN). | APN (UTF-8 encoded characters) |
| 31 | Calling-Station-ID | Identifier for the mobile station (MS), configurable on a per-APN basis. | MSISDN in international format, UTF-8 encoded decimal characters. |
| 32 | NAS-Identifier | Identifier of the NAS originating the request. | String |
| 40 | Acct-Status-Type | Type of accounting message. | Integer |
| 41 | Acct-Delay-Time | Number of seconds the broadband gateway has been trying to send this accounting record. | 32-bit unsigned integer |
| 42 | Acct-Input-Octets | Number of octets sent by the user for the IP-CAN bearer. | 32-bit unsigned integer |
| 43 | Acct-Output-Octets | Number of octets received by the user for the IP-CAN bearer. | 32-bit unsigned integer |
| 44 | Acct-Session-ID | User Session identifier, unique for every bearer under the session. | Broadband gateway Gn IP address (IPv4 or IPv6) and Charging-ID, concatenated in a UTF-8-encoded hexadecimal value |
| 45 | Acct-Authentic | Method by which user was authenticated: whether by RADIUS, the NAS itself, or another remote authentication protocol. | Integer:<br>1 - RADIUS<br>2 - Local<br>3 - Remote |
| 46 | Acct-Session-Time | Duration of the session, in seconds. | Integer |
| 47 | Acct-Input-Packets | Number of packets sent by the user. | Integer |
| 48 | Acct-Output-Packets | Number of packets received by the user. | Integer |

Table 26: RADIUS IETF Attributes Supported in Accounting Stop Messages *(continued)*

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 49 | Acct-Terminate-Cause | Reason the session was terminated. The session can be terminated for the following reasons:<br>• User Request (1)—User initiated the disconnect (log out).<br>• NAS Error (9)—Negotiation failures, connection failures, or address lease expiration.<br>• NAS Request (10)—PPP challenge timeout, PPP request timeout, tunnel establishment failure, PPP bundle failure, IP address lease expiration, PPP keep-alive failure, tunnel disconnect, or an unaccounted-for error. | Integer |
| 52 | Acct-Input-Gigawords | How many times the Acct-Input-Octets counter has wrapped around 2^32 over the course of this PDP session. | 32-bit unsigned integer |
| 53 | Acct-Output-Gigawords | How many times the Acct-Output-Octets counter has wrapped around 2^32 over the course of this PDP session. | 32-bit unsigned integer |
| 55 | Event-Timestamp | Time that this event occurred on the NAS, in seconds, since January 1, 1970 00:00 UTC. | 32-bit unsigned integer |

## 3GPP VSAs Supported in Accounting Stop Messages

Table 27 on page 181 lists the 3GPP vendor-specific attributes (VSAs) supported by the broadband gateway in Accounting Stop messages.

Table 27: 3GPP VSAs Supported in Accounting Stop Messages

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 26/10415/1 (3GPP type 1) | 3GPP-IMSI | IMSI for this user. | UTF-8 encoded string |
| 26/10415/2 | 3GPP-Charging-Id | Charging ID for this PDP context/EPS bearer. | Integer |
| 26/10415/3 | 3GPP-PDP Type | For a GGSN, this indicates the type of PDP context; for example, IP or PPP.<br><br>For a P-GW, this indicates the PDN type: IPv4, IPv6, or IPv4v6. | Integer |

Table 27: 3GPP VSAs Supported in Accounting Stop Messages *(continued)*

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 26/10415/5 | 3GPP-GPRS-Negotiated-QoS-Profile | QoS profile applied by the broadband gateway for the PDP context/EPS bearer. | UTF-8 encoded string |
| 26/10415/6 | 3GPP-SGSN-Address | For a GGSN, this represents the SGSN IPv4 address that is used by the GTP control plane for the handling of control messages.<br><br>For a P-GW, this represents the IPv4 address of the S-GW, trusted non-3GPP IP access or ePDG that is used on S5/S8, S2a or S2b for the handling of control messages.<br><br>This attribute may be used to identify the PLMN to which the user is attached. | IPv4 address |
| 26/10415/7 | 3GPP-GGSN-Address | For a GGSN, this represents the GGSN IPv4 address that is used by the GTP control plane for the context establishment.<br><br>For a P-GW, this represents the P-GW IPv4 address that is used on the S5/S8, S2a, S2b or S2c control plane for the IP-CAN session establishment.<br><br>The address is the same as the GGSN/P-GW IPv4 address used in the CDRs generated by the broadband gateway. | IPv4 address |
| 26/10415/8 | 3GPP-IMSI-MCC-MNC | The MCC and MNC extracted from the user's IMSI (first 5 or 6 digits, as applicable from the presented IMSI). | String |
| 26/10415/9 | 3GPP-GGSN-MCC-MNC | The MCC and MNC of the network to which the broadband gateway belongs. | String |
| 26/10415/10 | 3GPP-NSAPI | Identifier for a particular PDP context for the associated PDN and MSISDN/IMSI, from creation to deletion.<br><br>For a P-GW, this identifies the EPS bearer ID if it is known to the P-GW. | String |

Table 27: 3GPP VSAs Supported in Accounting Stop Messages *(continued)*

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 26/10415/12 | 3GPP-Selection-Mode | Selection mode for this PDP context/EPS bearer, received in the Create PDP Context/Session Request message. | String |
| 26/10415/13 | 3GPP-Charging-Characteristics | For a GGSN, this contains the charging characteristics for this PDP context, received in the Create PDP Context Request message (only available in R99 and later releases).<br><br>For a P-GW, this contains the charging characteristics for the IP-CAN bearer. | String |
| 26/10415/18 | 3GPP-SGSN-MCC-MNC | The MCC and MNC extracted from the RAI from the Create PDP Context Request and Update PDP Context Request messages. | String |
| 26/10415/21 | 3GPP-RAT-Type | The Radio Access Technology type that is currently serving the user equipment. | Octet string |
| 26/10415/22 | 3GPP-User-Location-Info | Information about where the user equipment is currently located (for example, SAI or CGI). | Octet string |
| 26/10415/23 | 3GPP-MS-TimeZone | The offset between UTC and local time in steps of 15 minutes of where the MS currently resides. | Octet string |

## Supported Attributes in Accounting On Messages

The following table lists the RADIUS attributes supported by the MobileNext Broadband Gateway in RADIUS Accounting On messages. Accounting On messages are sent by the broadband gateway to the RADIUS server to ensure correct synchronization of session information.


- RADIUS IETF Attributes Supported in Accounting On Messages on page 183


### RADIUS IETF Attributes Supported in Accounting On Messages

Table 28 on page 184 lists the RADIUS attributes supported by the broadband gateway in Accounting On messages.

Table 28: RADIUS IETF Attributes Supported in Accounting On Messages

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 4 | NAS-IP-Address | IPv4 address of the broadband gateway for communication with the RADIUS server. | IPv4 address |
| 32 | NAS-Identifier | Identifier of the NAS originating the request. | String |
| 40 | Acct-Status-Type | Type of accounting message. | Accounting-ON |
| 41 | Acct-Delay-Time | Number of seconds the broadband gateway has been trying to send this accounting record. | 32-bit unsigned integer |

## Supported Attributes in Disconnect Request Messages

The following tables list the RADIUS attributes and 3GPP VSAs supported by the MobileNext Broadband Gateway in RADIUS Disconnect Request messages. A Disconnect Request message is sent by the RADIUS server to terminate a user session on a NAS and discard all associated session contexts.

The broadband gateway listens on UDP ports 1700 and 3799 for RADIUS Disconnect Request messages sent from the RADIUS server. The user session identified by the Disconnect Request message is deleted on the broadband gateway.



### RADIUS IETF Attributes Supported in Disconnect Request Messages

Table 29 on page 184 lists the RADIUS attributes supported by the broadband gateway in Disconnect Request messages.

Table 29: RADIUS IETF Attributes Supported in Disconnect Request Messages

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 1 | User-Name | The username received in the Access-Request message, or a substitute username provided by the RADIUS server.<br><br>If a value for the User-Name attribute is received in the Access-Accept message, it takes precedence over any other value for the username. | String |

Table 29: RADIUS IETF Attributes Supported in Disconnect Request Messages *(continued)*

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 44 | Acct-Session-ID | User Session identifier, unique for every bearer under the session.<br><br>The broadband gateway deletes the user session indicated by this attribute. | Broadband gateway Gn IP address (IPv4 or IPv6) and Charging-ID, concatenated in a UTF-8-encoded hexadecimal value |

### 3GPP VSAs Supported in Disconnect Request Messages

Table 30 on page 185 lists the 3GPP VSAs supported by the broadband gateway in Disconnect Request messages.

Table 30: 3GPP VSAs Supported in Disconnect Request Messages

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 26/10415/1 (3GPP type 1) | 3GPP-IMSI | IMSI for this user. | UTF-8 encoded string |
| 26/10415/10 | 3GPP-NSAPI | Identifier for a particular PDP context for the associated PDN and MSISDN/IMSI, from creation to deletion.<br><br>For a P-GW, this identifies the EPS bearer ID if it is known to the P-GW. | String |

## Supported Attributes in Change of Authorization (CoA) Messages

The following tables list the RADIUS attributes and 3GPP VSAs supported by the MobileNext Broadband Gateway in RADIUS Change of Authorization (CoA) messages. CoA messages contain information for dynamically changing user session authorizations. They are typically used to change associated policies, filters, or QoS attributes.



### RADIUS IETF Attributes Supported in CoA Messages

Table 31 on page 186 lists the RADIUS attributes supported by the broadband gateway in CoA messages.

### Table 31: RADIUS IETF Attributes Supported in CoA Messages

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 1 | User-Name | The username received in the Access-Request message, or a substitute username provided by the RADIUS server.<br><br>If a value for the User-Name attribute is received in the Access-Accept message, it takes precedence over any other value for the username. | String |
| 4 | NAS-IP-Address | IPv4 address of the broadband gateway for communication with the RADIUS server. | IPv4 address |
| 30 | Called-Station-Id | Identifier for the target network (APN). | APN (UTF-8 encoded characters) |
| 31 | Calling-Station-ID | Identifier for the mobile station (MS), configurable on a per-APN basis. | MSISDN in international format, UTF-8 encoded decimal characters |
| 32 | NAS-Identifier | Identifier of the NAS originating the request. | String |
| 44 | Acct-Session-ID | User Session identifier, unique for every bearer under the session.<br><br>The broadband gateway performs the CoA action on the user session indicated by this attribute. | Broadband gateway Gn IP address (IPv4 or IPv6) and Charging-ID, concatenated in a UTF-8-encoded hexadecimal value |

## 3GPP VSAs Supported in CoA Messages

Table 32 on page 186 lists the 3GPP vendor-specific attributes (VSAs) supported by the broadband gateway in CoA messages.

### Table 32: 3GPP VSAs Supported in CoA Messages

| Attribute Number | Attribute Name | Description | Content |
|---|---|---|---|
| 26/10415/1 (3GPP type 1) | 3GPP-IMSI | IMSI for this user. | UTF-8 encoded string |
| 26/10415/2 | 3GPP-Charging-Id | Charging ID for this PDP context/EPS bearer. | Integer |
| 26/10415/5 | 3GPP-GPRS-Negotiated-QoS-Profile | QoS profile to be applied by the broadband gateway for the PDP context/EPS bearer as the CoA action. | UTF-8 encoded string |

## Configuring AAA on the Broadband Gateway

To configure authentication, authorization, and accounting (AAA) on the MobileNext Broadband Gateway:

1. Configure settings for the RADIUS servers.

   See "Configuring Interaction Between the Broadband Gateway and RADIUS Servers" on page 187.

2. Configure one or more network elements.

   See "Configuring Network Elements" on page 190.

3. (Optional) Configure a network element group to use with accounting.

   See "Configuring Network Element Groups" on page 191.

4. Configure an AAA profile.

   See "Configuring an AAA Profile" on page 192.

5. Configure AAA services for an APN.

   See "Applying an AAA Profile to an APN" on page 198.

NOTE: **If you plan to make changes to AAA settings for an existing APN, or modify an AAA profile that has already been applied to an APN, then you must place the affected APNs into maintenance mode prior to making the changes.**

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- Network Elements on page 159
- Network Element Groups on page 160
- AAA Profiles on page 161
- Mobility Maintenance Mode Overview on page 406
- Modifying an Access Point Name on page 410

## Configuring Interaction Between the Broadband Gateway and RADIUS Servers

You specify the RADIUS servers that the MobileNext Broadband Gateway can use, and you configure how the broadband gateway interacts with the servers. After the RADIUS servers are configured, you can include them in network elements.

To specify a RADIUS server and how the broadband gateway interacts with the server:

1. Configure the name of the RADIUS server.

   [edit]

```
user@host# edit access radius servers radius1
```

2. Configure the IP address of the RADIUS server.

```
[edit access radius servers radius-server-name]
user@host# set address 172.16.0.20
```

3. Configure an interface and IP address to specify the source address for RADIUS requests. The broadband gateway sends RADIUS requests to the RADIUS server using this source address.

```
[edit access radius servers radius-server-name]
user@host# set source-interface lo0.0 ipv4-address 10.10.10.10
```

4. Configure the required secret (password) to use with the RADIUS server for authentication. Secrets enclosed in quotation marks can contain spaces.

```
[edit access radius servers radius-server-name]
user@host# set secret nt1UE1*7688+
```

5. (Optional) Configure the port number the broadband gateway uses for RADIUS authentication. The default port number is 1812.

```
[edit access radius servers radius-server-name]
user@host# set port 1812
```

6. (Optional) Configure the shared secret to be used for RADIUS accounting. If you do not specify a shared secret for accounting, the shared secret configured for RADIUS authentication is used for accounting.

```
[edit access radius servers radius-server-name]
user@host# set accounting-secret xp1UE1*4852+
```

7. (Optional) Configure the RADIUS server accounting port number. The default accounting port number is 1813.

```
[edit access radius servers radius-server-name]
user@host# set accounting-port 1813
```

8. (Optional) Configure the number of times that the broadband gateway attempts to contact the RADIUS server. You can specify from 1 to 10 retries. The default setting is 3 retry attempts.

```
[edit access radius servers radius-server-name]
user@host# set retry 4
```

9. (Optional) Configure the length of time that the broadband gateway waits to receive a response from a RADIUS server. By default, the broadband gateway waits 3 seconds. You can configure the timeout to be from 1 through 90 seconds.

```
[edit access radius servers radius-server-name]
user@host# set timeout 45
```

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- Example: Configuring AAA on the Broadband Gateway on page 200

## Configuring RADIUS-Initiated Dynamic Request Support

When dynamic request support is enabled for a RADIUS server, the MobileNext Broadband Gateway uses the RADIUS server for both authentication and dynamic request operations, such as Change of Authorization (CoA) requests, Re-authorization requests, and Disconnect requests. The broadband gateway listens on UDP port 3799 for dynamic requests from the RADIUS server.

To configure dynamic request support for the RADIUS server:

1. Enable the broadband gateway to allow dynamic requests from the RADIUS server.

   [edit access radius servers *radius-server-name*]
   **user@host# set allow-dynamic-requests**

2. (Optional) Configure the shared secret to be used for the dynamic requests. If you do not specify a shared secret for dynamic requests, the shared secret configured for RADIUS authentication is used.

   [edit access radius servers *radius-server-name*]
   **user@host# set dynamic-requests-secret 71UE1*4852+**

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- Example: Configuring AAA on the Broadband Gateway on page 200

## Configuring Dead Server Detection

The MobileNext Broadband Gateway detects when a RADIUS server is “dead” (that is, has stopped responding to requests), and starts directing requests to another server in the network element.

When a request sent by the broadband gateway to the RADIUS server times out, it retransmits the request to the server. If the request continues to time out, and does so for a given number of times over a given interval, the broadband gateway marks the server as “dead,” then starts sending requests to a different server in the network element. After a given number of seconds, the broadband gateway marks the dead server alive again, and can once again start sending requests to the server, according to the load-balancing algorithm and the server’s priority in the network element configuration.

To configure dead server detection, you specify the number of retransmissions and interval required to mark a server dead, and the amount of time after the server is marked dead that it is marked alive again.

To configure dead server detection for the RADIUS server.

1. Set the dead-criteria retries limit. This is the number of request retransmissions required to mark a server dead.

   [edit access radius servers *radius-server-name* dead-criteria]
   **user@host# set retries 100**

2. Set the dead-criteria interval, in seconds. If the broadband gateway retransmits a request the number of times specified by the retries limit, over the number of seconds specified by the interval, the RADIUS server is marked dead.

   [edit access radius servers *radius-server-name* dead-criteria]
   user@host# **set interval 10**

3. Set the dead server revert interval, in seconds. When a server is marked dead, the broadband gateway waits this amount of time, then marks the server alive again.

   [edit access radius servers *radius-server-name*]
   user@host# **set revert-interval 10**

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- Example: Configuring AAA on the Broadband Gateway on page 200

## Configuring Network Elements

A network element is a load-balanced cluster of RADIUS servers. In an authentication, authorization, and accounting (AAA) profile, you select network elements to be used for authentication and accounting. When the AAA profile is applied to an access point name (APN), mobile subscribers attempting to get network access through the APN receive authentication or accounting services from one of the servers in the network element.

To configure a network element, you indicate the RADIUS servers that comprise it, optionally assign the servers a priority, and specify a load-balancing algorithm. You can also specify the maximum number of pending RADIUS requests that can be queued to the network element.

To configure a network element:

1. Specify the RADIUS servers that make up the network element.

   [edit access radius network-elements *network-element-name*]
   user@host# **set server radius01**

2. (Optional) Set the load-balancing algorithm for the network element. You can specify either direct or round-robin. The direct algorithm causes all requests to go to the first server configured in the network element; if that server cannot handle any additional requests (that is, the server is marked “dead”), they go to the next server in the list. The round-robin algorithm sends the first request to the first server in the list, the second request to the second server in the list, and so on; if a server is marked dead, it is removed from the round-robin selection rotation for the duration of the revert-interval.

   [edit access radius network-elements *network-element-name*]
   user@host# **set algorithm round-robin**

3. (Optional) Assign the RADIUS servers in the network element a priority of 1 or 2. The priority number is used for failover in case of server failure. The priority 2 servers are not used unless all the priority 1 servers fail. If all the priority 1 servers fail, then the broadband gateway starts using the priority 2 servers.

[edit access radius network-elements *network-element-name* server *server-name*]
user@host# **set priority 1**

4. (Optional) Specify the maximum number of requests that can be queued to the network element. When the pending request queue is full, any additional requests are dropped. If the number of pending requests reaches 80 percent of the maximum, an SNMP trap is generated. You can specify from 512 through 8192 for the pending request limit. The default is 8192.

   [edit access radius network-elements *network-element-name*]
   user@host# **set maximum-pending-reqs-limit 4096**

**Related Documentation**

- Network Elements on page 159
- Network Element Groups on page 160
- Example: Configuring AAA on the Broadband Gateway on page 200

## Configuring Network Element Groups

A network element group is a collection of network elements to which accounting request messages are sent.

To configure a network element group, you specify the network elements that comprise it, optionally indicate that a response is mandatory from a network element, and whether the MobileNext Broadband Gateway broadcasts accounting requests to all of the network elements in the group.

To configure a network element group:

1. Specify one or more network elements to make up the network element group.

   [edit access radius network-element-group *network-element–group-name*]
   user@host# **set network-element ne01**

2. (Optional) Indicate that a response is mandatory from the network element when the broadband gateway sends it an accounting request.

   [edit access radius network-element-group *network-element–group-name*]
   user@host# **set network-element ne01 mandatory**

3. (Optional) Specify that the broadband gateway broadcasts accounting requests to all network elements in the group.

   [edit access radius network-element-group *network-element–group-name*]
   user@host# **set broadcast**

**Related Documentation**

- Network Element Groups on page 160
- Network Elements on page 159
- Example: Configuring AAA on the Broadband Gateway on page 200

## Configuring an AAA Profile

To configure an authentication, authorization, and accounting (AAA) profile:

1. Create the AAA profile.

   ```
   [edit]
   user@host# edit unified-edge aaa mobile-profiles aaa-profile-name
   ```

2. Specify a network element to use for authentication.

   See "Configuring Authentication Settings in an AAA Profile" on page 192.

3. Configure accounting settings for the AAA profile.

   See "Configuring Accounting Settings in an AAA Profile" on page 193.

4. (Optional) Specify which RADIUS attributes the MobileNext Broadband Gateway ignores or excludes from RADIUS messages.

   See "Configuring RADIUS Attribute Usage for an AAA Profile" on page 194.

5. (Optional) Specify values for RADIUS attributes that the broadband gateway includes in RADIUS requests.

   See "Specifying RADIUS Options in an AAA Profile" on page 198.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- AAA Profiles on page 161
- Example: Configuring AAA on the Broadband Gateway on page 200

## Configuring Authentication Settings in an AAA Profile

In an authentication, authorization, and accounting (AAA) profile, you specify which of the configured network elements you want to use for authentication. Users accessing the access point name (APN) to which the AAA profile is applied are authenticated using one of the RADIUS servers in the specified network element.

To configure authentication settings for an AAA profile:

- Enter the name of the configured network element to use for RADIUS authentication:

  ```
  [edit unified-edge aaa mobile-profiles aaaprofile radius authentication]
  user@host# set network-element ne01
  ```

**Related Documentation**

- AAA Profiles on page 161
- Network Elements on page 159
- Example: Configuring AAA on the Broadband Gateway on page 200

## Configuring Accounting Settings in an AAA Profile

To configure accounting settings for an authentication, authorization, and accounting (AAA) profile:

1. If you are using a network element for RADIUS accounting, enter the name of the configured network element to use.

   [edit unified-edge aaa mobile-profiles *aaaprofile* radius accounting]
   user@host# **set network-element ne01**

2. If you are using a network element group for RADIUS accounting, enter the name of the configured network element group to use.

   [edit unified-edge aaa mobile-profiles *aaaprofile* radius accounting]
   user@host# **set network-element-group ne-grp01**

   NOTE: In an AAA profile, you must specify either a network element or a network element group for accounting.

3. (Optional) Configure the MobileNext Broadband Gateway to send an Accounting-On message when a services PIC is restarted.

   [edit unified-edge aaa mobile-profiles *aaaprofile* radius accounting]
   user@host# **set send-accounting-on**

4. (Optional) Configure how often the broadband gateway sends accounting Interim-Update messages. You can specify from 10 through 1440 minutes. If you do not configure this option, the broadband gateway does not send accounting Interim-Update messages at regular intervals, but only when events listed in Table 33 on page 193 occur.

   [edit unified-edge aaa mobile-profiles *aaaprofile* radius accounting]
   user@host# **set trigger interim-interval 20**

5. (Optional) Specify which events you want to exclude from triggering accounting Interim-Update messages. Table 33 on page 193 lists the events you can specify.

   [edit unified-edge aaa mobile-profiles *aaaprofile* radius accounting trigger]
   user@host# **set trigger no-rat-change**

### Table 33: Events You Can Exclude from Triggering Interim-Update Messages

| Event | CLI Entry to disable Interim-Updates for the event |
|---|---|
| The IPv4 address update for the mobile subscriber is deferred. | no-deferred-ipv4-address-update |
| The Mobile Station (MS) time zone changes. | no-ms-timezone-change |
| The Public Land Mobile Network (PLMN) to which the mobile subscriber is attached changes. | no-plmn-change |
| The QoS profile applied by the broadband gateway for the PDP context/EPS bearer changes. | no-qos-change |

Table 33: Events You Can Exclude from Triggering Interim-Update Messages *(continued)*

| Event | CLI Entry to disable Interim-Updates for the event |
|---|---|
| The Radio Access Technology (RAT) serving the mobile subscriber changes. | no-rat-change |
| The SGSN/S-GW serving the mobile subscriber changes. | no-sgw-change |
| The location information for the mobile subscriber changes. | no-user-location-information-change |

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- AAA Profiles on page 161
- Network Elements on page 159
- Network Element Groups on page 160
- Example: Configuring AAA on the Broadband Gateway on page 200

## Configuring RADIUS Attribute Usage for an AAA Profile

In an authentication, authorization, and accounting (AAA) profile, you can specify which RADIUS attributes the MobileNext Broadband Gateway ignores in the RADIUS Access-Accept messages it receives, as well as which RADIUS attributes the broadband gateway excludes from specific types of RADIUS messages it sends to the RADIUS server. The broadband gateway supports a number of 3GPP vendor-specific attributes (VSAs). You can configure the AAA profile to exclude any or all of them from specified RADIUS message types.

To configure how RADIUS attributes are handled for an AAA profile:

1. Specify the RADIUS attributes you want the broadband gateway to ignore in Access-Accept messages. See Table 34 on page 195 for the attributes you can configure.

   **[edit unified-edge aaa mobile-profiles *aaaprofile* radius attributes ignore]**
   **user@host# set framed-ip-netmask**

2. Specify which attributes the broadband gateway excludes from specific types of RADIUS messages it sends to the RADIUS server. See Table 35 on page 195 for the RADIUS attributes and message type combinations you can configure. See Table 36 on page 196 for the 3GPP VSAs and message type combinations you can configure.

   The **all-3gpp** keyword causes the broadband gateway to exclude all of the 3GPP VSAs listed in Table 36 on page 196 from the specified RADIUS message types.

   **[edit unified-edge aaa mobile-profiles *aaaprofile* radius attributes exclude]**
   **user@host# set all-3gpp access-request**

You use the **ignore** statement to configure the broadband gateway to ignore a particular attribute in RADIUS Access-Accept messages. By default, the broadband gateway processes the attributes received from the external RADIUS server. Table 34 on page 195 lists the attributes supported in the **ignore** statement.

### Table 34: RADIUS Attributes the Broadband Gateway Can Ignore in Accept-Accept Messages

| CLI Entry | Attribute Name | Attribute Number |
|---|---|---|
| framed-ip-netmask | Framed-Ip-Netmask | RADIUS attribute 9 |

You use the **exclude** statement to configure the broadband gateway to exclude the specified attributes from the specified type of RADIUS message. Not all attributes appear in all types of RADIUS messages—the CLI indicates the RADIUS message type. By default, the broadband gateway includes the specified attributes in RADIUS messages. Table 35 on page 195 lists the RADIUS attributes and message types supported in the **exclude** statement.

### Table 35: RADIUS Attributes the Broadband Gateway Can Exclude from RADIUS Messages

| CLI Entry | Attribute Name | Attribute Number | Supported Message Type |
|---|---|---|---|
| accounting-authentic | Acct-Authentic | RADIUS attribute 45 | Accounting-Start<br>Accounting-Stop<br>Accounting-Interim |
| accounting-delay-time | Acct-Delay-Time | RADIUS attribute 41 | Accounting-Start<br>Accounting-Stop<br>Accounting-Interim |
| accounting-terminate-cause | Acct-Terminate-Cause | RADIUS attribute 49 | Accounting-Stop |
| called-station-id | Called-Station-Id | RADIUS attribute 30 | Access-Request<br>Accounting-Start<br>Accounting-Stop<br>Accounting-Interim |
| calling-station-id | Calling-Station-Id | RADIUS attribute 31 | Access-Request<br>Accounting-Start<br>Accounting-Stop<br>Accounting-Interim |
| event-time-stamp | Event-Timestamp | RADIUS attribute 55 | Accounting-Start<br>Accounting-Stop<br>Accounting-Interim |

Table 35: RADIUS Attributes the Broadband Gateway Can Exclude from RADIUS Messages *(continued)*

| CLI Entry | Attribute Name | Attribute Number | Supported Message Type |
|---|---|---|---|
| input-gigapackets | Acct-Input-Gigapackets | Juniper Networks VSA 26–42 | Accounting-Stop<br>Accounting-Interim |
| input-gigawords | Acct-Input-Gigawords | RADIUS attribute 52 | Accounting-Stop<br>Accounting-Interim |
| nas-identifier | NAS-Identifier | RADIUS attribute 32 | Access-Request<br>Accounting-Start<br>Accounting-Stop |
| nas-ip-address | NAS-IP-Address | RADIUS attribute 4 | Access-Request<br>Accounting-Start<br>Accounting-Stop<br>Accounting-On<br>Accounting-Interim |
| nas-port-type | NAS-Port-Type | RADIUS attribute 61 | Access-Request |
| ouput-gigapackets | Acct-Output-Gigapackets | Juniper Networks VSA 26–43 | Accounting-Stop<br>Accounting-Interim |
| output-gigawords | Acct-Output-Gigawords | RADIUS attribute 53 | Accounting-Stop<br>Accounting-Interim |

Table 36 on page 196 lists the 3GPP VSAs supported in the **exclude** statement. You can exclude individual 3GPP VSAs by entering the VSA's name in the CLI, or you can exclude all of the 3GPP VSAs by entering the **all-3gpp** keyword.

Table 36: 3GPP VSAs That Can Be Excluded from RADIUS Messages

| CLI Entry | Attribute Name | Attribute Number | Supported Message Type |
|---|---|---|---|
| imeisv | 3GPP-IMEISV | 3GPP VSA 26–20 | Access-Request<br>Accounting-Start |

Table 36: 3GPP VSAs That Can Be Excluded from RADIUS Messages *(continued)*

| CLI Entry | Attribute Name | Attribute Number | Supported Message Type |
|---|---|---|---|
| imsi | 3GPP-IMSI | 3GPP VSA 26-1 | Access-Request<br>Accounting-Start<br>Accounting-Stop<br>Accounting-Interim |
| imsi-mcc-mnc | 3GPP-IMSI-MCC-MNC | 3GPP VSA 26-8 | Access-Request<br>Accounting-Start<br>Accounting-Stop<br>Accounting-Interim |
| sgsn-mcc-mnc | 3GPP-SGSN-MCC-MNC | 3GPP VSA 26-18 | Access-Request<br>Accounting-Start<br>Accounting-Stop<br>Accounting-Interim |
| user-location-info | 3GPP-USER-LOCATION-INFO | 3GPP VSA 26-22 | Access-Request<br>Accounting-Start<br>Accounting-Stop<br>Accounting-Interim |

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- AAA Profiles on page 161
- Example: Configuring AAA on the Broadband Gateway on page 200

## Specifying RADIUS Options in an AAA Profile

When configuring an authentication, authorization, and accounting (AAA) profile on the MobileNext Broadband Gateway, you can optionally specify values for a number of RADIUS attributes that the broadband gateway includes in the RADIUS messages it generates. You can specify a value for the NAS IP address attribute (RADIUS attribute 4), a prefix to be used with the NAS Identifier attribute (RADIUS attribute 32), and a value for the NAS Port Type attribute (RADIUS attribute 61).

To specify RADIUS options:

1. Specify a value for the nas-ip-address option. If this option is specified, the broadband gateway uses this IP address as the value for RADIUS attribute 4 (NAS-IP-Address) in RADIUS requests; otherwise, the broadband gateway uses the IP address set in the **source-interface** statement in the RADIUS server configuration.

   [edit unified-edge aaa mobile-profiles *aaaprofile* radius options]
   user@host# **set nas-ip-address 172.16.0.20**

2. Specify a value for the nas-identifier-prefix option. When this option is specified, the broadband gateway appends the ID of the services PIC to the nas-identifier-prefix value, and uses the combined prefix and services PIC ID as the value for RADIUS attribute 32 (NAS-Identifier) in RADIUS requests. If the services PICs are part of a redundancy group, the broadband gateway appends the aggregated multiservices interface (ams) ID to the prefix instead of the services PIC ID.

   [edit unified-edge aaa mobile-profiles *aaaprofile* radius options]
   user@host# **set nas-identifier-prefix imagio**

3. Specify a value for the nas-port-type option. In an AAA profile, you can specify a NAS port type of virtual or wireless. The broadband gateway uses this as the value for RADIUS attribute 61 (NAS-Port-Type) in RADIUS requests. The default is virtual.

   [edit unified-edge aaa mobile-profiles *aaaprofile* radius options]
   user@host# **set nas-port-type wireless**

**Related Documentation**

- AAA Profiles on page 161
- Example: Configuring AAA on the Broadband Gateway on page 200

## Applying an AAA Profile to an APN

To apply an authentication, authorization, and accounting (AAA) profile to an access point name (APN):

1. Indicate that you want to configure services for a particular APN.

   [edit unified-edge gateways ggsn-pgw MBG1 apn-services]
   user@host# **edit apn *apn-name***

2. Specify the name of the AAA profile you want to apply to this APN.

   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns *apn-name*]
   user@host# **set aaa-profile *aaa-profile-name***

Related Documentation
- Configuring APNs on the MobileNext Broadband Gateway Overview on page 111
- AAA Profiles on page 161
- Example: Configuring AAA on the Broadband Gateway on page 200

## Enabling Address Assignment by the RADIUS Server

You can optionally configure the MobileNext Broadband Gateway to allow the RADIUS server to assign addresses to mobile subscribers. If this option is configured, the broadband gateway uses the address received in the Framed-IP-Address attribute (RADIUS attribute 8) of the Access-Accept message as the IP address for the subscriber.

If this option is not configured, the IP addresses are assigned locally by the broadband gateway using the address pool or group configured on the access point name (APN).

- To enable address assignment by the RADIUS server:

  [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns *apn-name*]
  user@host# **set address-assignment aaa**

Related Documentation
- Configuring Address Assignment on a Broadband Gateway APN on page 121
- Example: Configuring AAA on the Broadband Gateway on page 200

## Configuring AAA-Assigned Addresses to Override Locally or DHCP-Assigned Addresses

If the configured address-assignment method for the access point name (APN) is set to **local** or **dhcp-proxy-client**, then the MobileNext Broadband Gateway assigns addresses to mobile subscribers using one of these methods. You can optionally configure the broadband gateway so that if an address is also assigned to the mobile subscriber by a RADIUS server, then the RADIUS-assigned address is used in place of the locally assigned or DHCP-assigned address.

- To configure AAA-assigned addresses to override locally assigned addresses:

  [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns *apn-name* address-assignment]
  user@host# **set address-assignment local aaa-override**

- To configure AAA-assigned addresses to override DHCP-assigned addresses:

  [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns *apn-name* address-assignment]
  user@host# **set address-assignment dhcp-proxy-client aaa-override**

Related Documentation
- Configuring Address Assignment on a Broadband Gateway APN on page 121
- Example: Configuring AAA on the Broadband Gateway on page 200

## Configuring the Broadband Gateway to Wait for an Accounting Response

When accounting is configured for an access point name (APN), the MobileNext Broadband Gateway generates an Accounting Start message when it receives a Create Session Request or Create PDP Context Request message from the user equipment. By default, the broadband gateway does not wait for the accounting response from the RADIUS server before sending the Create Session Response or Create PDP Context Response message.

You can optionally configure the broadband gateway to send the Create Session Response or Create PDP Context Response message only after it receives the Accounting Start Response message from the RADIUS server.

- To configure the broadband gateway to wait for an accounting response before creating a session for the user equipment:

  **[edit unified-edge gateways ggsn-pgw MBG1 apn-services apns *apn-name*]**
  **user@host# set wait-accounting**

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- Configuring General APN Parameters on the Broadband Gateway on page 115

## Example: Configuring AAA on the Broadband Gateway



### Requirements

This example uses the following hardware and software components:

- Junos OS Release 11.2W
- Juniper Networks MobileNext Broadband Gateway, including the following components:
  - MX240 3D Universal Edge Router, MX480 3D Universal Edge Router, or MX960 3D Universal Edge Router
  - Mobile Multiservices DPC (MS-DPC)
  - Mobile 10-Gigabit Ethernet MPC with SFP+ or Mobile 60-Gigabit Ethernet Enhanced Queuing MPC line card

### Overview

This example documents an authentication, authorization, and accounting (AAA) configuration where the broadband gateway interacts with a collection of RADIUS servers

to provide AAA services to mobile subscribers accessing an access point name (APN). The RADIUS servers are configured into network elements, and some of the network elements are placed into a network element group. One of the network elements provides authentication services, and the network element group receives the accounting messages.

One of the RADIUS servers is configured to provide support for dynamic requests, such as Change of Authorization (CoA) requests and Disconnect requests. Note that this dynamic request server is not part of a network element.

The APN is configured to use the RADIUS server for IP address assignment. When a mobile subscriber is authenticated, the Access-Accept message specifies the IP address to be assigned to the subscriber. If a mobile subscriber cannot be authenticated based on the contents of the Create PDP Context Request or Create Session Request message, then the mobile subscriber is authenticated with the username of "aaa" and the password "Password123."

The AAA configuration example consists of the following parts:

1. Configuring the RADIUS servers.

   This part of the configuration establishes settings for the dynamic request server, *radiusDR*, and eight other RADIUS servers, *radius1* through *radius8*. The configurations for the RADIUS servers are basically identical, with some minor differences. Server radiusDR has dynamic requests enabled, which means that the broadband gateway acts upon CoA requests and Disconnect requests originating from the radiusDR server.

   Also note that dead server detection is configured for the RADIUS servers: the **dead-criteria retries 10 interval 10** and **revert-interval 100** statements mean that if the broadband gateway has to retransmit a request to the server 10 times over a 10-second interval, the server is marked "dead," and the broadband gateway starts sending requests to a different server. After the revert-interval of 100 seconds, the server is marked "alive," and the broadband gateway can direct requests to it again.

2. Configuring the loopback interface.

   This part of the configuration set addresses on the lo0 interface for the dynamic request server and for the other RADIUS servers.

3. Configuring the network elements.

   This part of the configuration creates three network elements: ne1, ne2, and ne3, which are made up of the RADIUS servers configured in part 1. In network element ne1, the radius1 and radius2 servers are configured as priority 1, and radius3 is priority 2. The load-balancing algorithm is configured as Direct. When the broadband gateway sends requests to ne1, they go only to the radius1 server, up to the point where radius1 is marked dead. At that point, they go to radius2. Once the revert-interval configured for radius1 (100 seconds) expires, the broadband gateway can start directing requests to radius1 again. Only if both priority 1 servers are marked dead, does the broadband gateway start sending requests to the priority 2 server, radius3.

   Network elements ne2 and ne3 both use the round-robin load-balancing algorithm. When sending requests to ne2, the broadband gateway sends the first request to radius4, the second request to radius5, the third to radius4, and so on. For ne3, since

radius6 and radius7 are priority 1 servers, the broadband gateway alternates requests between the two servers. If both of the servers are marked dead, then the broadband gateway sends requests to the priority 2 server, radius8.

4. Configuring the network element group.

   This part of the configuration creates a network element group, ne-grp1, consisting of network elements ne2 and ne3, which were configured in part 2. The broadband gateway sends accounting messages to the network elements in the group.

   In the example, the **broadcast** parameter is specified, which causes the broadband gateway to send the accounting messages to all of the network elements in the group. The **mandatory** option is configured for network element ne2, which means that a response is required from a server in ne2 before services can be provided to the mobile subscriber. If you configure the **broadcast** parameter for a network element group, you must specify the **mandatory** parameter for at least one of the network elements.

5. Configuring the AAA profile.

   This part of the configuration sets up an AAA profile, aaa-prof. The AAA profile specifies that network element ne1 is used for authentication, and network element group ne-grp01 is used for accounting.

   For accounting, Interim-Update messages are sent every 10 minutes, and when any of the trigger events occur. The one exception is if the QoS profile applied by the broadband gateway for the PDP context/EPS bearer changes; that is, the broadband gateway receives an accounting message with a 3GPP-GPRS-Negotiated-QoS-Profile attribute (3GPP VSA 26-5) that has a value different from the one previously received. In this case, it does not trigger the broadband gateway to send an Interim-Update message.

   In the RADIUS messages it generates, the broadband gateway sets values for the following RADIUS attributes:

   - For the NAS-Identifier attribute (RADIUS attribute 32), the value is the string *imagio*, prefixed to the ID of the services PIC handling NAS functions for the mobile subscriber.
   - For the NAS-Port-Type attribute (RADIUS attribute 61), the value is set to *wireless*.

   The broadband gateway excludes certain RADIUS attributes from specific types of RADIUS messages it generates:

   - The Called-Station-Id attribute (RADIUS attribute 30) is excluded from Access-Request messages.
   - The Event-Timestamp attribute (RADIUS attribute 55) is excluded from Accounting Start messages.

   The broadband gateway ignores the Framed-Ip-Netmask attribute (RADIUS attribute 9) in Access-Accept messages it receives from the RADIUS server.

6. Applying AAA services to an APN.

   This part of the configuration applies AAA services to an APN, internet123. The AAA services are configured for the APN by specifying the AAA profile to use—in this case,

*aaa-prof*—configured in the previous part. When mobile subscribers attempt to gain access to this APN, they receive AAA services as indicated by the settings in the aaa-prof profile.

In addition, the APN is configured to use AAA as the address assignment method. This means that the broadband gateway assigns an IP address to a mobile subscriber using information returned from the RADIUS server in the Access-Accept message.

If the broadband gateway cannot determine the subscriber's username and password from the Create PDP Context Request or Create Session Request message, then the username and password configured under **anonymous-user** are used to authenticate the subscriber.

## Configuration



### Configuring the RADIUS Servers

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set access radius servers radiusDR address 50.50.50.110
set access radius servers radiusDR secret "$9$BWYErvx7VY2axNs4oJkq"
set access radius servers radiusDR allow-dynamic-requests
set access radius servers radiusDR dynamic-request-secret "$9$rXYKWxbs4Di.Ndi"
set access radius servers radiusDR source-interface lo0.0 ipv4-address 200.6.80.1

set access radius servers radius1 address 200.6.101.2
set access radius servers radius1 secret "$9$BWYErvx7VY2axNs4oJkq"
set access radius servers radius1 accounting-secret "$9$rpEvX-Y2aUDkYgGiHqzF"
set access radius servers radius1 dead-criteria retries 10 interval 10
set access radius servers radius1 revert-interval 100
set access radius servers radius1 source-interface lo0.0 ipv4-address 200.6.88.1

set access radius servers radius2 address 200.6.102.2
set access radius servers radius2 secret "$9$BWYErvx7VY2axNs4oJkq"
set access radius servers radius2 accounting-secret "$9$rpEvX-Y2aUDkYgGiHqzF"
set access radius servers radius2 dead-criteria retries 10 interval 10
set access radius servers radius2 revert-interval 100
set access radius servers radius2 source-interface lo0.0 ipv4-address 200.6.88.1

set access radius servers radius3 address 200.6.103.2
set access radius servers radius3 secret "$9$BWYErvx7VY2axNs4oJkq"
set access radius servers radius3 accounting-secret "$9$rpEvX-Y2aUDkYgGiHqzF"
```

```
set access radius servers radius3 dead-criteria retries 10 interval 10
set access radius servers radius3 revert-interval 100
set access radius servers radius3 source-interface lo0.0 ipv4-address 200.6.88.1

set access radius servers radius4 address 200.6.104.2
set access radius servers radius4 secret "$9$BWYErvx7VY2axNs4oJkq"
set access radius servers radius4 accounting-secret "$9$rpEvX-Y2aUDkYgGiHqzF"
set access radius servers radius4 dead-criteria retries 10 interval 10
set access radius servers radius4 revert-interval 100
set access radius servers radius4 source-interface lo0.0 ipv4-address 200.6.88.1

set access radius servers radius5 address 200.6.105.2
set access radius servers radius5 secret "$9$BWYErvx7VY2axNs4oJkq"
set access radius servers radius5 accounting-secret "$9$rpEvX-Y2aUDkYgGiHqzF"
set access radius servers radius5 dead-criteria retries 10 interval 10
set access radius servers radius5 revert-interval 100
set access radius servers radius5 source-interface lo0.0 ipv4-address 200.6.88.1

set access radius servers radius6 address 200.6.106.2
set access radius servers radius6 secret "$9$BWYErvx7VY2axNs4oJkq"
set access radius servers radius6 accounting-secret "$9$rpEvX-Y2aUDkYgGiHqzF"
set access radius servers radius6 dead-criteria retries 10 interval 10
set access radius servers radius6 revert-interval 100
set access radius servers radius6 source-interface lo0.0 ipv4-address 200.6.88.1

set access radius servers radius7 address 200.6.107.2
set access radius servers radius7 secret "$9$BWYErvx7VY2axNs4oJkq"
set access radius servers radius7 accounting-secret "$9$rpEvX-Y2aUDkYgGiHqzF"
set access radius servers radius7 dead-criteria retries 10 interval 10
set access radius servers radius7 revert-interval 100
set access radius servers radius7 source-interface lo0.0 ipv4-address 200.6.88.1

set access radius servers radius8 address 200.6.108.2
set access radius servers radius8 secret "$9$BWYErvx7VY2axNs4oJkq"
set access radius servers radius8 accounting-secret "$9$rpEvX-Y2aUDkYgGiHqzF"
set access radius servers radius8 dead-criteria retries 10 interval 10
set access radius servers radius8 revert-interval 100
set access radius servers radius8 source-interface lo0.0 ipv4-address 200.6.88.1
```

**Step-by-Step Procedure**

To configure the RADIUS servers:

1. Configure the settings for the dynamic request server, radiusDR. Enable dynamic request support, and specify a shared secret for dynamic request messages.

   ```
   [edit]
   user@pe1# set access radius servers radiusDR address 50.50.50.110
   user@pe1# set access radius servers radiusDR secret "$9$BWYErvx7VY2axNs4oJkq"
   user@pe1# set access radius servers radiusDR allow-dynamic-requests
   user@pe1# set access radius servers radiusDR dynamic-request-secret
     "$9$rXYKWxbs4Di.Ndi"
   user@pe1# set access radius servers radiusDR source-interface lo0.0 ipv4-address
     200.6.80.1
   ```

2. Configure the settings for the radius1 server.

```
[edit]
user@pe1# set access radius servers radius1 address 200.6.101.2
user@pe1# set access radius servers radius1 secret "$9$BWYErvx7VY2axNs4oJkq"
user@pe1# set access radius servers radius1 accounting-secret
  "$9$rpEvX-Y2aUDkYgGiHqzF"
user@pe1# set access radius servers radius1 dead-criteria retries 10 interval 10
user@pe1# set access radius servers radius1 revert-interval 100
user@pe1# set access radius servers radius1 source-interface lo0.0 ipv4-address
  200.6.88.1
```

NOTE: Apart from the server name and address, the configuration of servers radius2 through radius8 is identical.

3. Configure the settings for the radius2 server.

```
[edit]
user@pe1# set access radius servers radius2 address 200.6.102.2
user@pe1# set access radius servers radius2 secret "$9$BWYErvx7VY2axNs4oJkq"
user@pe1# set access radius servers radius2 accounting-secret
  "$9$rpEvX-Y2aUDkYgGiHqzF"
user@pe1# set access radius servers radius2 dead-criteria retries 10 interval 10
user@pe1# set access radius servers radius2 revert-interval 100
user@pe1# set access radius servers radius2 source-interface lo0.0 ipv4-address
  200.6.88.1
```

4. Configure the settings for the radius3 server.

```
[edit]
user@pe1# set access radius servers radius3 address 200.6.103.2
user@pe1# set access radius servers radius3 secret "$9$BWYErvx7VY2axNs4oJkq"
user@pe1# set access radius servers radius3 accounting-secret
  "$9$rpEvX-Y2aUDkYgGiHqzF"
user@pe1# set access radius servers radius3 dead-criteria retries 10 interval 10
user@pe1# set access radius servers radius3 revert-interval 100
user@pe1# set access radius servers radius3 source-interface lo0.0 ipv4-address
  200.6.88.1
```

5. Configure the settings for the radius4 server.

```
[edit]
user@pe1# set access radius servers radius4 address 200.6.104.2
user@pe1# set access radius servers radius4 secret "$9$BWYErvx7VY2axNs4oJkq"
user@pe1# set access radius servers radius4 accounting-secret
  "$9$rpEvX-Y2aUDkYgGiHqzF"
user@pe1# set access radius servers radius4 dead-criteria retries 10 interval 10
user@pe1# set access radius servers radius4 revert-interval 100
user@pe1# set access radius servers radius4 source-interface lo0.0 ipv4-address
  200.6.88.1
```

6. Configure the settings for the radius5 server.

```
[edit]
user@pe1# set access radius servers radius5 address 200.6.105.2
user@pe1# set access radius servers radius5 secret "$9$BWYErvx7VY2axNs4oJkq"
user@pe1# set access radius servers radius5 accounting-secret
  "$9$rpEvX-Y2aUDkYgGiHqzF"
```

```
user@pe1# set access radius servers radius5 dead-criteria retries 10 interval 10
user@pe1# set access radius servers radius5 revert-interval 100
user@pe1# set access radius servers radius5 source-interface lo0.0 ipv4-address
  200.6.88.1
```

7. Configure the settings for the radius6 server.

```
[edit]
user@pe1# set access radius servers radius6 address 200.6.106.2
user@pe1# set access radius servers radius6 secret "$9$BWYErvx7VY2axNs4oJkq"
user@pe1# set access radius servers radius6 accounting-secret
  "$9$rpEvX-Y2aUDkYgGiHqzF"
user@pe1# set access radius servers radius6 dead-criteria retries 10 interval 10
user@pe1# set access radius servers radius6 revert-interval 100
user@pe1# set access radius servers radius6 source-interface lo0.0 ipv4-address
  200.6.88.1
```

8. Configure the settings for the radius7 server.

```
[edit]
user@pe1# set access radius servers radius7 address 200.6.107.2
user@pe1# set access radius servers radius7 secret "$9$BWYErvx7VY2axNs4oJkq"
user@pe1# set access radius servers radius7 accounting-secret
  "$9$rpEvX-Y2aUDkYgGiHqzF"
user@pe1# set access radius servers radius7 dead-criteria retries 10 interval 10
user@pe1# set access radius servers radius7 revert-interval 100
user@pe1# set access radius servers radius7 source-interface lo0.0 ipv4-address
  200.6.88.1
```

9. Configure the settings for the radius8 server.

```
[edit]
user@pe1# set access radius servers radius8 address 200.6.108.2
user@pe1# set access radius servers radius8 secret "$9$BWYErvx7VY2axNs4oJkq"
user@pe1# set access radius servers radius8 accounting-secret
  "$9$rpEvX-Y2aUDkYgGiHqzF"
user@pe1# set access radius servers radius8 dead-criteria retries 10 interval 10
user@pe1# set access radius servers radius8 revert-interval 100
user@pe1# set access radius servers radius8 source-interface lo0.0 ipv4-address
  200.6.88.1
```

### Configuring the Loopback Interface

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set interfaces lo0 unit 0 family inet address 200.6.80.1/32
set interfaces lo0 unit 0 family inet address 200.6.88.1/32
```

**Step-by-Step Procedure**

1. Configure a loopback address for the dynamic request server. The dynamic request server uses this as the destination address for CoA requests and Disconnect requests.

```
[edit]
user@pe1# set interfaces lo0 unit 0 family inet address 200.6.80.1/32
```

2. Configure a loopback address for the other RADIUS servers.

```
[edit]
user@pe1# set interfaces lo0 unit 0 family inet address 200.6.88.1/32
```

### Configuring the Network Elements

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set access radius network-elements ne1 server radius1 priority 1
set access radius network-elements ne1 server radius2 priority 1
set access radius network-elements ne1 server radius3 priority 2
set access radius network-elements ne1 algorithm direct
set access radius network-elements ne1 maximum-pending-reqs-limit 2048

set access radius network-elements ne2 server radius4 priority 1
set access radius network-elements ne2 server radius5 priority 1
set access radius network-elements ne2 algorithm round-robin

set access radius network-elements ne3 server radius6 priority 1
set access radius network-elements ne3 server radius7 priority 1
set access radius network-elements ne3 server radius8 priority 2
set access radius network-elements ne3 algorithm round-robin
```

**Step-by-Step Procedure**

To configure the network elements:

1. Configure the settings for network element ne1. Add RADIUS servers radius1, radius2, and radius3, set the load-balancing algorithm to direct, and set the maximum pending requests limit to 2048.

   ```
   [edit]
   user@pe1# set access radius network-elements ne1 server radius1 priority 1
   user@pe1# set access radius network-elements ne1 server radius2 priority 1
   user@pe1# set access radius network-elements ne1 server radius3 priority 2
   user@pe1# set access radius network-elements ne1 algorithm direct
   user@pe1# set access radius network-elements ne1 maximum-pending-reqs-limit
     2048
   ```

2. Configure the settings for network element ne2. Add RADIUS servers radius4 and radius5, and set the load-balancing algorithm to round-robin.

   ```
   [edit]
   user@pe1# set access radius network-elements ne2 server radius4 priority 1
   user@pe1# set access radius network-elements ne2 server radius5 priority 1
   user@pe1# set access radius network-elements ne2 algorithm round-robin
   ```

3. Configure the settings for network element ne3. Add RADIUS servers radius6, radius7, and radius8, and set the load-balancing algorithm to round-robin.

   ```
   [edit]
   user@pe1# set access radius network-elements ne3 server radius6 priority 1
   user@pe1# set access radius network-elements ne3 server radius7 priority 1
   user@pe1# set access radius network-elements ne3 server radius8 priority 2
   user@pe1# set access radius network-elements ne3 algorithm round-robin
   ```

### Configuring the Network Element Group

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set access radius network-element-group ne-grp1 network-element ne2 mandatory
set access radius network-element-group ne-grp1 network-element ne3
set access radius network-element-group ne-grp1 broadcast
```

**Step-by-Step Procedure**

To configure the network element group:

1. Add network elements ne2 and ne3 to network element group ne-grp1, and indicate that a response from ne2 is mandatory in order to provide services to the mobile subscriber.

   ```
   [edit]
   user@pe1# set access radius network-element-group ne-grp1 network-element ne2
     mandatory
   user@pe1# set access radius network-element-group ne-grp1 network-element ne3
   ```

2. Configure accounting messages to be broadcast to all of the network elements in the group.

   ```
   [edit]
   user@pe1# set access radius network-element-group ne-grp1 broadcast
   ```

### Configuring the AAA Profile

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge aaa mobile-profiles aaa-prof radius authentication network-element ne1
set unified-edge aaa mobile-profiles aaa-prof radius accounting network-element-group
  ne-grp1
set unified-edge aaa mobile-profiles aaa-prof radius trigger interim-interval 10
set unified-edge aaa mobile-profiles aaa-prof radius trigger no-qos-change
set unified-edge aaa mobile-profiles aaa-prof radius options nas-identifier-prefix imagio
set unified-edge aaa mobile-profiles aaa-prof radius options nas-port-type wireless
set unified-edge aaa mobile-profiles aaa-prof radius options nas-ip-address 200.6.80.1
set unified-edge aaa mobile-profiles aaa-prof radius attributes exclude called-station-id
  access-request
set unified-edge aaa mobile-profiles aaa-prof radius attributes exclude event-time-stamp
  accounting-start
set unified-edge aaa mobile-profiles aaa-prof radius attributes ignore framed-ip-netmask
```

**Step-by-Step Procedure**

To configure the AAA profile:

1. Indicate that network element ne1 is to be used for authentication.

   ```
   [edit]
   user@pe1# set unified-edge aaa mobile-profiles aaa-prof radius authentication
     network-element ne1
   ```

2. Indicate that network element group ne-grp1 is to be used for accounting.

```
[edit]
user@pe1# set unified-edge aaa mobile-profiles aaa-prof radius accounting
  network-element-group ne-grp1
```

3. Configure the broadband gateway to send accounting Interim-Update messages every 10 minutes.

```
[edit]
user@pe1# set unified-edge aaa mobile-profiles aaa-prof radius trigger
  interim-interval 10
```

4. Configure the broadband gateway so that it does not trigger an accounting Interim-Update message if the QoS profile applied to the PDP context/EPS bearer changes.

```
[edit]
user@pe1# set unified-edge aaa mobile-profiles aaa-prof radius trigger
  no-qos-change
```

5. Configure the broadband gateway to set the NAS-Identifier attribute in RADIUS messages to the string *imagio*, prefixed to the ID of the services PIC handling NAS functions for the mobile subscriber.

```
[edit]
user@pe1# set unified-edge aaa mobile-profiles aaa-prof radius options
  nas-identifier-prefix imagio
```

6. Configure the broadband gateway to set the NAS-Port-Type attribute in RADIUS messages to *wireless*.

```
[edit]
user@pe1# set unified-edge aaa mobile-profiles aaa-prof radius options
  nas-port-type wireless
```

7. Configure the broadband gateway to use 200.6.80.1 as the value for the NAS-IP-Address attribute in RADIUS requests. (This causes the CoA requests and Disconnect requests sent from the dynamic request server to have a source address of 50.50.50.110 and a destination address of 200.6.80.1.)

```
[edit]
user@pe1# set unified-edge aaa mobile-profiles aaa-prof radius options
  nas-ip-address 200.6.80.1
```

8. Configure the broadband gateway to exclude the Called-Station-Id attribute from RADIUS Access-Request messages.

```
[edit]
user@pe1# set unified-edge aaa mobile-profiles aaa-prof radius attributes exclude
  called-station-id access-request
```

9. Configure the broadband gateway to exclude the Event-Timestamp attribute from RADIUS Accounting Start messages.

```
[edit]
user@pe1# set unified-edge aaa mobile-profiles aaa-prof radius attributes exclude
  event-time-stamp accounting-start
```

10. Configure the broadband gateway to ignore the Framed-Ip-Netmask attribute in Access-Accept messages it receives from the RADIUS server.

```
[edit]
user@pe1# set unified-edge aaa mobile-profiles aaa-prof radius attributes ignore
  framed-ip-netmask
```

## Applying AAA Services to an APN

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways ggsn-pgw MBG1 apn-services apns internet123 apn-data-type
  ipv4
set unified-edge gateways ggsn-pgw MBG1 apn-services apns internet123 mobile-interface
  mif.0
set unified-edge gateways ggsn-pgw MBG1 apn-services apns internet123 aaa-profile
  aaa-prof
set unified-edge gateways ggsn-pgw MBG1 apn-services apns internet123
  address-assignment aaa
set unified-edge gateways ggsn-pgw MBG1 apn-services apns internet123 anonymous-user
  user-name aaa
set unified-edge gateways ggsn-pgw MBG1 apn-services apns internet123 anonymous-user
  password "Password123"
```

**Step-by-Step Procedure**

To configure AAA services for the APN:

1. If not set already, set the data type and mobile interface for APN internet123.

   ```
   [edit]
   user@pe1# set unified-edge gateways ggsn-pgw MBG1 apn-services apns internet123
     apn-data-type ipv4
   user@pe1# set unified-edge gateways ggsn-pgw MBG1 apn-services apns internet123
     mobile-interface mif.0
   ```

2. Configure the APN to use the settings in the *aaa-prof* AAA profile.

   ```
   [edit]
   user@pe1# set unified-edge gateways ggsn-pgw MBG1 apn-services apns internet123
     aaa-profile aaa-prof
   ```

3. Configure the broadband gateway to use the AAA server for IP address assignment. IP addresses are assigned to mobile subscribers using information returned in RADIUS Access-Accept messages.

   ```
   [edit]
   user@pe1# set unified-edge gateways ggsn-pgw MBG1 apn-services apns internet123
     address-assignment aaa
   ```

4. Configure the broadband gateway to authenticate a mobile subscriber using the username “aaa” and the password “Password123” if username and password information cannot be determined from the Protocol Configuration Options (PCO) received in the Create PDP Context Request or Create Session Request message.

   ```
   [edit]
   user@pe1# set unified-edge gateways ggsn-pgw MBG1 apn-services apns internet123
     anonymous-user user-name aaa
   user@pe1# set unified-edge gateways ggsn-pgw MBG1 apn-services apns internet123
     anonymous-user password "Password123"
   ```

## Verification

### Verifying Authentication

**Purpose** Verify that authentication functions are working on the broadband gateway and for the individual RADIUS servers.

**Action** To show authentication statistics for the broadband gateway:

```
user@host> show unified-edge ggsn-pgw aaa statistics authentication
Authentication module statistics
  Requests: 3
  Accepts: 3
  Rejects: 0
  Challenges: 0
  Requests timed out: 0
  Transmit errors: 0
  Response errors: 0
  Pending requests: 0
```

To show authentication statistics for an individual RADIUS server:

```
user@host> show unified-edge ggsn-pgw aaa radius statistics authentication detail name radius1
RADIUS server: radius1 (FPC/PIC: 1/0)
  Address: 200.6.101.2 Port: 1812
  Routing-instance: default
  State: Active  Duration: 00:28:01
  Prev duration: 00:00:00      Flaps: 0
  Access requests: 0
  Access req retransmissions: 0
  Access accepts: 0
  Access rejects: 0
  Access challenges: 0
  Malformed responses: 0
  Bad authenticators: 0
  Pending requests: 0
  Timeouts: 0
  Unknown types: 0
  Packets dropped: 0
  Round trip time (ms): 0 (Min: 0 Max: 0 Avg: 0)
  Time since counters were last cleared: 00:00:00
```

### Verifying Accounting

**Purpose** Verify that accounting functions are working on the broadband gateway and for the individual RADIUS servers.

**Action** To show accounting statistics for the broadband gateway:

```
user@host> show unified-edge ggsn-pgw aaa statistics accounting
Accounting module statistics
  Requests: 12
  Responses success: 12
  Requests timed out: 0
  Transmit errors: 0
  Response errors: 0
  Pending requests: 0
```

To show accounting statistics for an individual RADIUS server:

```
user@host> show unified-edge ggsn-pgw aaa radius statistics accounting detail name radius1
RADIUS server: radius1 (FPC/PIC: 1/0)
  Address: 200.6.101.2 Port: 1813
  Routing-instance: default
  State: Active  Duration: 00:28:21
  Prev duration: 00:00:00      Flaps: 0
  Accounting requests: 0
    Start: 0      Stop: 0      Interim: 0      On: 0      Off: 0
  Accounting req retransmissions: 0
  Accounting responses: 0
  Malformed responses: 0
  Bad authenticators: 0
  Pending requests: 0
  Timeouts: 0
  Unknown types: 0
  Packets dropped: 0
  Round trip time (ms): 0 (Min: 0 Max: 0 Avg: 0)
  Time since counters were last cleared: 00:00:00
```

### Verifying Dynamic Requests

**Purpose** Verify that dynamic request functions are working on the broadband gateway and for the dynamic request server.

**Action** To show dynamic request statistics for the broadband gateway:

```
user@host> show unified-edge ggsn-pgw aaa statistics dynamic-requests
Dynamic Requests module statistics
  Requests received: 8
  CoA Requests received: 8
  Dm Requests received: 0
  CoA Acks sent: 7
  CoA Nacks sent: 1
  Dm Acks sent: 0
  Dm Nacks sent: 0
  Dropped: 0
```

To show dynamic request statistics for the dynamic request server radiusDR:

```
user@host> show unified-edge ggsn-pgw aaa radius statistics dynamic-requests detail name
radiusDR
RADIUS client: radiusDR (FPC/PIC: 3/0)
  Address: 50.50.50.110
  CoA Requests received: 0
  Dm Requests received: 0
  CoA Acks sent: 0
  CoA Nacks sent: 0
  Dm Acks sent: 0
  Dm Nacks sent: 0
  Dropped: 0
  Duplicates: 0
  Dispatched: 0
  Timeouts: 0
  Sent to SMd: 0
  Invalid RADIUS codes: 0
  Errors during processing: 0
```

```
  Invalid RADIUS authenticators: 0
  Invalid or missing Charging Ids: 0
  RCM errors: 0
  Time since counters were last cleared: 00:00:00
```

### Verifying Network Element Status

**Purpose** Verify that the RADIUS servers in the network elements are active.

**Action**

```
user@host> show unified-edge ggsn-pgw aaa network-element status name ne1
Network-element: ne1
  Server: radius1, Priority: 1, State: Active
  Server: radius2, Priority: 1, State: Active
  Server: radius3, Priority: 2, State: Active
```

### Verifying Address Assignment

**Purpose** Verify that address assignment by the AAA server is working properly.

**Action**

```
user@host> show unified-edge ggsn-pgw address-assignment statistics
Address assignment statistics
  Total address allocations: 0
  Total allocation failures: 0
  Total address releases: 0
```

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- Configuring AAA on the Broadband Gateway on page 187
- Configuring APNs on the MobileNext Broadband Gateway Overview on page 111
- Configuring Anonymous Users on a Broadband Gateway APN on page 120
- Configuring Address Assignment on a Broadband Gateway APN on page 121

CHAPTER 8

# Configuring DHCP



## DHCP Overview

The Dynamic Host Configuration Protocol (DHCP) is an automatic configuration protocol on IP networks, which eliminates the need for intervention by a network administrator. Networks and systems connected to IP networks must be configured before they can communicate with other computers on the network. DHCP maintains a database that helps to track computers that have been connected to the network and this prevents two computers from accidentally being configured with the same IP address.

The IP address is the most important configuration parameter of the DHCP. A computer must be initially assigned a specific IP address that is appropriate to the network to which the computer is attached and that is not assigned to any other computer on that network. If you move a computer to a new network, it must be assigned a new IP address for that new network. You can use the DHCP to manage these assignments automatically.

An IP client contacts a DHCP server for configuration parameters. The DHCP server is typically centrally located and operated by the network administrator. The server is run by a network administrator so that DHCP clients can be reliably and dynamically configured with parameters appropriate to the current network architecture.

You can configure the MX router to support the following DHCP features:

- DHCP Configuration under APN Configuration
- DHCP Profile Configuration

### DHCP Protocol

The DHCP is based on a bootstrap protocol (BOOTP) that provides clients the means to allot their own IP address, the IP address of a server host, and the name of a bootstrap file. DHCP servers can serve requests from BOOTP clients and provide additional capabilities beyond BOOTP, such as the automatic allocation of reusable IP addresses and additional configuration options.

DHCP provides two primary functions:

- Allocating temporary or permanent IP addresses to clients
- Storing, managing, and providing client configuration parameters

## DHCP Proxy Client

In regular DHCP client configuration, the client and server are on the same subnet. The client makes a request to the server for an IP address and other configuration items and associates them with the local host interface. This may happen at boot time or at renewal time or at interface initialization. In a DHCP proxy configuration, the client and server are on different subnets. The proxy intercepts the request from the client and mimics the server. It forwards the request from the client to the server and informs the server of the subnet from which the client is requesting an IP address. The server responds with the IP address and other attributes, which are forwarded to the client via the proxy. In a DHCP proxy client, the subscriber manager requests the DHCP server for an IP address and other configurations on behalf of the subscriber. The proxy hides the server details by acting as the server from the view of the subscriber, whereas the actual client uses the IP address and other configuration details. The server notices this proxy agent and communicates to the client like it would communicate with the normal proxy agent in the network.

## Configuring DHCP Proxy Client

To configure a DHCPv4 or a DHCPv6 profile, configure the DHCP proxy client on the system services for the routing instance. Use the following procedure to set up a DHCPv4 profile. Use the same procedure to set up a DHCPv6 profile.

To configure a DHCPv4 profile on the system services for a routing instance on an MX router.

1. Configure the bind interfaces for the DHCPv4 profile. For a DHCPv4 proxy client, the interface must be configured with the valid **inet** address and **inet** address family. Similarly, for the DHCPv6 profile, the interface must be configured with the valid **inet6** address and **inet6** family.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set bind-interfaces** *interface-name ip-address*

2. Configure the dead server retry interval for the DHCPv4 profile. The range for the number of seconds before reconnecting to a dead server, which was marked down in previous attempts, is from 300 through 3600.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set dead-server-retry-interval** *n*

3. Configure the dead server successive retry attempt for the DHCPv4 profile. The range for the number of successive retry attempts before declaring an unresponsive server dead is from 5 through 1000.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set dead-server-successive-retry-attempt** *n*

4. Configure the DHCP server selection algorithm for the DHCPv4 profile. The DHCP server is selected either by the highest priority or round-robin method, according to the option specified for server selection.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set dhcp-server-selection-algorithm [highest-priority-server | round-robin]**

5. Configure the lease time for the DHCPv4 profile. The range for the minimum and maximum allowable lease times that are accepted in responses from DHCP servers is from 60 through 1000.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set lease-time *n***

6. Configure the pool name for the DHCPv4 profile. The pool name is sent to the server only if it is configured and is optional.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set pool-name *string***

7. Configure the retransmission attempt for the DHCPv4 profile. The range for the maximum number of times that the system attempts to communicate with the unresponsive DHCP server before it is considered a failure is from 0 through 1000.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set retransmission-attempt *n***

8. Configure the retransmission interval for the DHCP4 profile. The range for the amount of time that must pass with no response before the system reattempts to communicate with the DHCP server is from 4 through 64.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set retransmission-interval *n***

9. Configure the servers for the DHCPv4 profile. This is applicable only to DHCPv4 and a minimum of one server must be configured for effective communication between the DHCP proxy clients and the DHCP server.

   [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]
   user@host# **set servers *ip-v4address* priority;**

## Configuring DHCP Under APN

To configure a DHCPv4-proxy-client-profile or a DHCPv6-proxy-client-profile, configure the address assignment on the APN services for **unified-edge gateways ggsn-pgw**. Use the following configuration to set up a DHCPv4-proxy client profile. Use the same procedures to set up a DHCPv6-proxy client profile.

To configure a DHCPv4 profile on the system services for a routing instance on an MX router:

1. Configure the DHCPv4 proxy client profile.

   [edit unified-edge gateways ggsn-pgw *name* apn-services apn *name*
   address-assignment]
   user@host# **set dhcpv4-proxy-client-profile logical-system *ls* routing-instance *ri***
   **profile-name *dhcpv4-prof-namename-of-pool-to-send-to-dhcp-server***

PART 5

# GPRS Tunneling Protocol (GTP) Configuration

CHAPTER 9

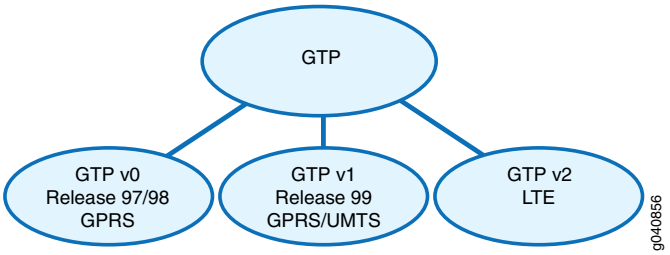
# Configuring GTP

## GTP Versions and GPRS Interfaces Overview

The General Packet Radio Service (GPRS) tunneling protocol (GTP) is used to tunnel GTP packets through 3G and 4G networks. A MobileNext Broadband Gateway configured as a gateway GPRS support node (GGSN), Packet Data Network Gateway (P-GW), or GGSN/P-GW automatically selects the appropriate GTP version based on the capabilities of the serving GPRS support node (SGSN) or Serving Gateway (S-GW) to which it is connected.

Figure 38 on page 222 shows the GTP versions that the broadband gateway supports.

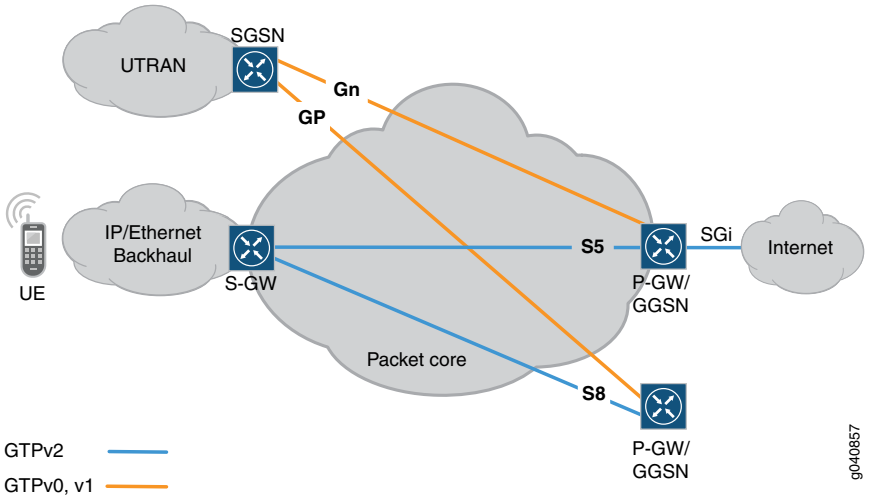
**Figure 38: GTP Versions Supported on a MobileNext Broadband Gateway**




GTP is the primary protocol used in a GPRS core network and allows users in a 3G or 4G network to move from one location to another while remaining connected to the Internet as if from one location at the GGSN or P-GW by carrying user traffic from the user's current SGSN or S-GW to the GGSN or P-GW that handles the user's session.

Figure 39 on page 223 shows the GTP-C versions the broadband gateway supports for the 3G and 4G network interfaces.

Figure 39: GTP-C Versions Supported for 3G/4G Network Interfaces




For 3G networks, a broadband gateway uses GTP v0, or GTPv1, or both to transport GTP packets on the GPRS interfaces:

- Gn—The Gn interface is the connection between an SGSN and a GGSN within the same public land mobile network (PLMN).
- Gp—The Gp interface is the connection between two PLMNs.

NOTE: GTPv1 is used for both GTP-C and GTP-U. The GTPv1-C protocol runs on UDP port 2123. The GTPv1-U protocol runs on UDP port 2152.

For 4G networks, a broadband gateway uses GTP v2 to transport GTP packets on the GPRS interfaces:

- S5—The S5 interface is the connection between an S-GW and a P-GW within the same PLMN.
- S8—The S8 interface is the connection between two PLMNs.

NOTE: The GTPv2 protocol is a control-only protocol and runs on UDP port 2123.

**Related Documentation**

- GPRS Tunneling Protocol (GTP) Overview on page 224
- GTP Tunnel Management Overview on page 228
- Configuring General GTP Service on the S-GW on page 257

## GPRS Tunneling Protocol (GTP) Overview

The GPRS Tunneling Protocol (GTP) is the tunneling protocol defined by the 3GPP standards to carry General Packet Radio Service (GPRS) within 3G/4G networks.

GTP is used to establish a GTP tunnel, for user equipment, between a Serving Gateway (S-GW) and Packet Data Network Gateway (P-GW), and an S-GW and Mobility Management Entity (MME). A GTP tunnel is a channel between two GPRS support nodes through which two hosts exchange data. The S-GW receives packets from the user equipment and encapsulates them within a GTP header before forwarding them to the P-GW through the GTP tunnel. When the P-GW receives the packets, it decapsulates them and forwards them to the external host.

GTP comprises the following separate protocols:

- GTP-C— Performs signaling between the S-GW and P-GW in the core GPRS network to activate and deactivate subscriber sessions, adjust the quality of service parameters, or update sessions for roaming subscribers who have arrived from another S-GW. GTP-C supports transport of control packets in IPv4 format.
- GTP-U— Transports user data within the core GPRS network and between the Radio Access Network (RAN) and the core network. GTP-U supports IPv4 and IPv6 user data, but transport is IPv4.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- GTP Path Management Overview on page 224
- GTP Tunnel Management Overview on page 228
- Configuring General GTP Service on the S-GW on page 257

## GTP Path Management Overview

A GPRS tunneling protocol (GTP) path is active only when both the Packet Data Network Gateway (P-GW) and Serving Gateway (S-GW) are active. The MobileNext Broadband Gateway performs the following functions to check that a peer is active:

- If path management is enabled, the broadband gateway sends periodic echo requests to all peers identified in the peer information table.
- When an echo-request message is received from a peer, the broadband gateway sends an echo-response message.
- If a peer does not respond after a specified number of echo requests, the peer is declared down and all subscriber sessions with the peer are brought down

This topic covers:

- Default Path Management Configuration on page 225
- GTP Version Support for Echo Requests and Echo Responses on page 225

## Default Path Management Configuration

When you configure a broadband gateway as a P-GW without explicitly configuring path management, the following options are automatically enabled with their default values:

- **echo-n3-requests**—Specifies the maximum number of times that the gateway attempts to send a echo-request message. The default is 8 times.
- **echo-t3-response**—Specifies the number of seconds that the gateway waits for a response from a peer gateway before sending the next echo-request message. The default is 15 seconds.
- **echo-interval**—Specifies the number of seconds that the gateway waits before resending a signaling-request message after a response to an echo request is received. The default is 60 seconds.

  While an echo response from the peer is pending, the broadband gateway does not send new echo requests even if the path management **echo-interval** elapses. This would occur if echo-t3/echo-n3 is greater than the echo interval and the peer does not respond to the echo request.

  NOTE: **The echo-interval timer functions independently from the echo-n3-requests/echo-t3-response timer.**

- **path-management**—Specifies whether path management is enabled or disabled on the broadband gateway. By default, control path management is enabled and data path management is disabled.

  NOTE: **If path-management is disabled, the broadband gateway does continue to send echo-response messages to peer-initiated echo-request messages.**

## GTP Version Support for Echo Requests and Echo Responses

Echo messages are sent to the peer using the GTP version that the peer supports. A broadband gateway configured as a GGSN, P-GW, or GGSN/P-GW supports sending echo replies to GTPv0, GTPv1, and GTPv2 echo requests from a peer SGSN or S-GW.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- GTP Tunnel Management Overview on page 228
- Understanding Tunnel Endpoint Identifiers on page 233
- Configuring General GTP Service on the S-GW on page 257

## Understanding Path Management

For a GTP path to be active, the Packet Data Network Gateway (P-GW) and its peer Serving Gateway (S-GW) must be active. To determine that a peer gateway is active, the P-GW exchanges echo-request and echo-response messages. The exchange of the echo-request and echo-response messages between a MobileNext Broadband Gateway and an S-GW allows for quick detection if a GTP path failure occurs.

An echo-request sequence begins when the broadband gateway (P-GW) sends an echo-request message to the S-GW and ends when the S-GW sends a corresponding echo-response message back to the broadband gateway. Path failure occurs when the broadband gateway does not receive a response after a certain number of retries, and all subscriber sessions associated with the down peer are deleted.

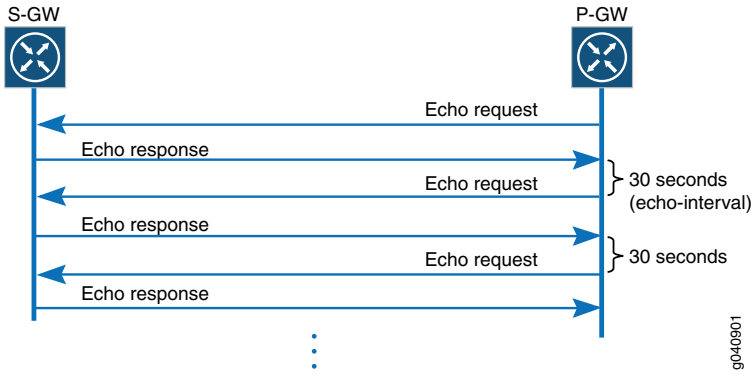
This topic includes the following sections:



### Successful Echo-Request Sequence for Path Management

In a successful echo-request sequence, the broadband gateway sends an echo-request message to the S-GW and the S-GW sends a corresponding echo-response message back to the broadband gateway, within the configured **echo-n3-requests** and **echo-t3-response** time. Figure 40 on page 226 shows a successful echo-request sequence, in which the P-GW receives an echo response for each echo request.

Figure 40: Successful Echo-Request Sequence for Path Management




The following steps describe the echo request/response sequence in Figure 40 on page 226:

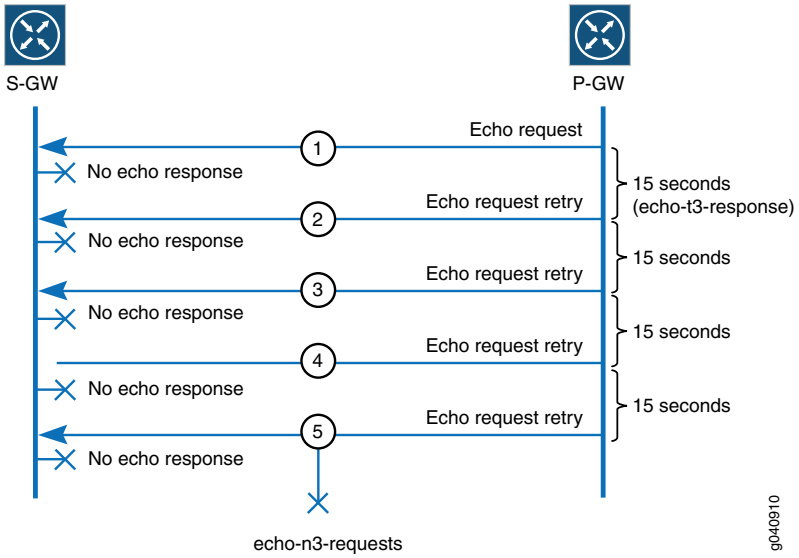
1. An echo request is sent, and the P-GW receives an echo response within the specified **echo-t3-response** time.
2. The P-GW waits for the configured echo-interval (or default echo-interval of 60 seconds) before sending another echo request, and the P-GW receives an echo response within the specified **echo-t3-response** time.

3. The P-GW waits for the configured echo-interval (or default echo-interval of 60 seconds) before sending another echo request, and the P-GW receives an echo response within the specified **echo-t3-response** time.

## Failed Echo Request Sequence for Path Management

If, after sending a specified number of echo-request messages to the S-GW, the broadband gateway fails to receive a corresponding echo-response message from the S-GW, the GTP path is determined to be down. Figure 41 on page 227 shows a failed echo-request and response sequence in which the P-GW does not receive an echo response within the configured number of **echo-n3-requests** (5 requests) and default **echo-t3-response** time (15 seconds).

Figure 41: Failed Echo-Request Sequence for Path Management




The following steps describe the echo-request and echo-response sequence in Figure 41 on page 227:

1. The first echo request is sent, but the P-GW does not receive an echo response from the peer within the configured **echo-t3-response** time of 15 seconds.
2. The second echo request is sent, but the P-GW does not receive an echo response within 15 seconds.
3. The third echo request is sent, but the P-GW does not receive an echo response within 15 seconds.
4. The fourth echo request is sent, but the P-GW does not receive an echo response within 15 seconds.
5. The fifth echo request is sent, but the P-GW does not receive an echo response within 15 seconds. At this point, the message flow stops, and the P-GW clears the GTP path and deletes all bearers.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- GTP Path Management Overview on page 224
- GTP Tunnel Management Overview on page 228
- Understanding Tunnel Endpoint Identifiers on page 233
- Configuring General GTP Service on the S-GW on page 257

## GTP Tunnel Management Overview

GTP-C controls and manages tunnels for the nodes connecting to the network in order to establish the user data path. A GTP tunnel is used to deliver packets between the P-GW and S-GW, and is identified in each node by a tunnel endpoint identifier (TEID), an IP address, and a UDP port number. Tunnel management involves creating and deleting end-user sessions and creating, modifying, and deleting bearers during the time a user is connected and using network services.

This tunnel management topic covers:

- GTP Tunnel Management Functions on page 228
- Default Tunnel Management Configuration on page 228
- GTP Version Support for Tunnel Management Requests and Responses on page 228

### GTP Tunnel Management Functions

A broadband gateway provides the following tunnel management functions to manage the GTP tunnel between a GGSN and SGSN or a P-GW and S-GW:

- Send Update bearer request to all peers identified in the Peer Information table.
- Send Delete bearer request to all peers identified in the Peer Information table.
- Send Delete Session request to all peers identified in the Peer Information table.

### Default Tunnel Management Configuration

When you configure a broadband gateway as a P-GW, the tunnel management options are automatically enabled with the following default values:

- **n3-requests**—Specifies the maximum number of times that the gateway attempts to send a Create/Update/Delete tunnel request message. The default is 3 times.
- **t3-response**—Specifies the number of seconds that the gateway waits for a Create/Update/Delete tunnel response from a peer gateway before retransmitting a Create/Update/Delete tunnel request message. The default is 5 seconds.

### GTP Version Support for Tunnel Management Requests and Responses

Create/update/delete tunnel requests are sent to the peer using the GTP version that the peer supports. A broadband gateway configured as a P-GW supports sending

Create/Update/Delete responses to GTPv0, GTPv1, and GTPv2 requests from a peer S-GW.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- GTP Path Management Overview on page 224
- Understanding Tunnel Endpoint Identifiers on page 233
- Configuring General GTP Service on the S-GW on page 257

## Understanding Tunnel Management

You can configure tunnel management on the MobileNext Broadband Gateway to specify the maximum number of request messages to send and how long to wait for a response from a peer before sending a retransmit message.

A tunnel management request-and-response sequence begins when the broadband gateway (P-GW) sends a request message to the S-GW and ends when the S-GW sends a corresponding response message back to the broadband gateway. If the broadband gateway does not receive a response from the S-GW after a certain number of retries, tunnel failure results. When tunnel failure occurs, the broadband gateway deletes the subscriber session associated with the down peer and all Modify or Delete requests associated with that GPRS tunneling protocol (GTP) tunnel.

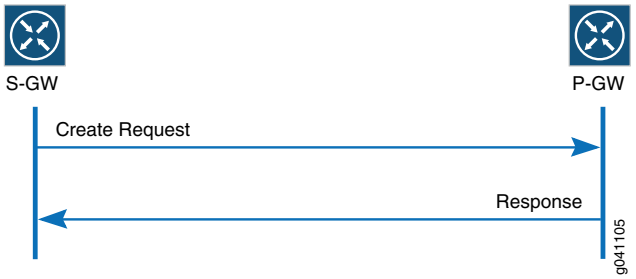
This topic covers:

- Successful Create Request Sequence for Tunnel Management on page 229
- Successful Update/Delete Request Sequence for Tunnel Management on page 230
- Failed Update/Delete Request Sequence for Tunnel Management on page 230

### Successful Create Request Sequence for Tunnel Management

The tunnel management process begins when the Serving Gateway (S-GW) sends a Create request message to the broadband gateway (P-GW), and the broadband gateway sends a corresponding response message back to the S-GW, signaling that the GTP tunnel is active. Figure 42 on page 229 shows a successful Create request sequence in which the S-GW receives a response after sending a request.

**Figure 42: Successful Create Request Sequence for Tunnel Management**



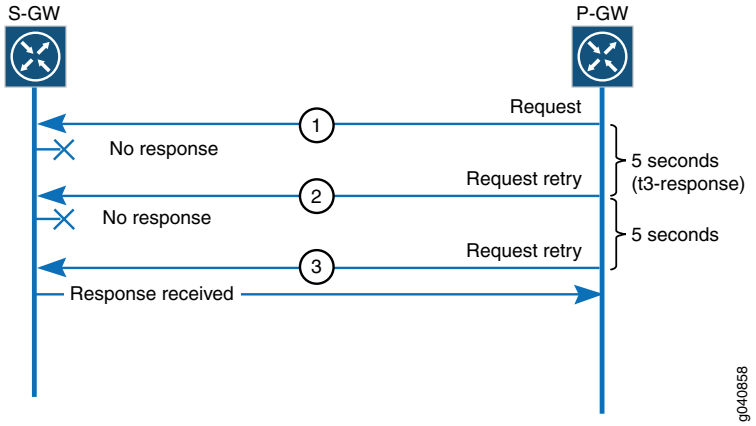
The following steps describe the tunnel management Create request sequence in Figure 42 on page 229:

1. The S-GW sends a Create request message to the P-GW.
2. The P-GW sends a response back to the S-GW.

## Successful Update/Delete Request Sequence for Tunnel Management

The tunnel management process begins when the broadband gateway (P-GW) sends an Update or Delete request message to the S-GW, and the S-GW sends a corresponding response message back to the broadband gateway, signaling that the GTP tunnel is active. Figure 43 on page 230 shows a successful Update or Delete request sequence in which the P-GW receives a response to each request within the specified default values for number of requests and response time.

### Figure 43: Successful Update/Delete Request Sequence for Tunnel Management



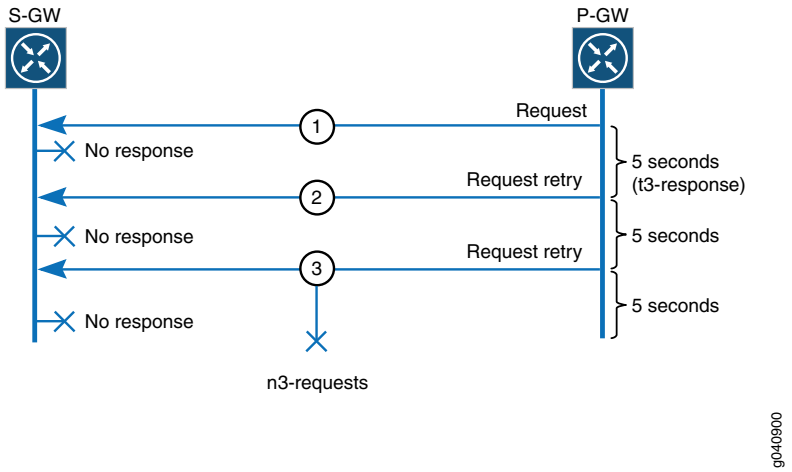

The following steps describe the tunnel management Update or Delete request sequence in Figure 43 on page 230:

1. A request is sent, but the P-GW receives no response within the specified **t3-response** time.
2. A second request is sent, but the P-GW receives no response within the specified **t3-response** time.
3. A third request is sent, and the P-GW receives a response within the specified **t3-response** time.

## Failed Update/Delete Request Sequence for Tunnel Management

If, after sending a specified number of Update or Delete request messages to the S-GW, the broadband gateway fails to receive a corresponding response message from the S-GW, the tunnel path is determined to be down. Figure 44 on page 231 shows a failed tunnel management request sequence in which the P-GW does not receive a response within the specified defaults for number of requests and the response time.

Figure 44: Failed Update/Delete Request Sequence for Tunnel Management




The following steps describe the Update or Delete request failed sequence in Figure 44 on page 231:

1. The first request is sent, but the P-GW receives no response from the peer within the specified **t3-response** time (5 seconds).
2. The second request is sent, but the P-GW receives no response from the peer within the specified **t3-response** time.
3. The third request is sent, but the P-GW receives no response from the peer within the specified **t3-response** time.
4. At this point, the message flow stops, and the P-GW deletes the subscriber session associated with the down peer and all Update or Delete requests associated with that GTP tunnel.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- GTP Path Management Overview on page 224
- GTP Tunnel Management Overview on page 228
- Understanding Tunnel Endpoint Identifiers on page 233
- Configuring General GTP Service on the S-GW on page 257

## Restart Counters Overview

The MobileNext Broadband Gateway configured as a P-GW includes the P-GW restart counter (IE) in all GTPv2 messages that it sends to peers. The broadband gateway also receives the S-GW restart counters in GTPv2 messages from the S-GW.

A broadband gateway configured as a P-GW increments the restart counter each time the P-GW is restarted. A broadband gateway receives the peer restart count from the recovery IE in the following GTP-C messages:

- Echo request
- Echo response
- Bearer/PDP context create
- Update messages

A broadband gateway identifies a peer restart by comparing the locally stored peer restart event with the most recent restart count that is received from a peer. If the broadband gateway detects that a peer has restarted by comparing the previously received restart count with the currently received restart count, the broadband gateway deletes all the subscriber sessions associated with the down peer.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- GTP Path Management Overview on page 224
- GTP Tunnel Management Overview on page 228
- Configuring General GTP Service on the S-GW on page 257

## Understanding CSID Signaling

A Connection Set Identifier (CSID) identifies a group of subscribers and is used during recovery procedures or, when recovery is not possible, to inform peer nodes when a partial failure occurs on the Serving Gateway (S-GW) or Packet Data Network Gateway (P-GW). A *partial failure* is a hardware or software failure that affects a significant number of (but not all) Packet Data Network (PDN) connections. CSIDs are supported on GTPv2 interfaces only.

The CSID can represent a large number of PDN connections within a node (S-GW, P-GW). Each node maintains a local mapping of a CSID to its internal resources. When one or more of those local resources fail, GTPv2 Connection Set Delete request messages send one or more corresponding fully qualified CSIDs to the peer nodes. A fully qualified CSID (FQ-CSID) is the combination of the node identity and the CSID that the node assigns, which together globally identify a set of PDN connections.

A CSID provides notifications based on a set of PDN connections. When the node needs to delete the PDN connections identified by a CSID, the P-GW or S-GW sends a single message to its peers, rather than sending a separate message for each PDN connection. For example, if the S-GW wants to delete a set of PDN connections identified by a CSID, it sends one PDN delete message with FQ-CSID IE (with the value set to CSID) to all connected P-GWs. The receiving P-GWs then delete the PDN connections associated with the received CSID.

**Related Documentation**

- GPRS Tunneling Protocol (GTP) Overview on page 224
- GTP Path Management Overview on page 224
- GTP Tunnel Management Overview on page 228
- Understanding Tunnel Endpoint Identifiers on page 233

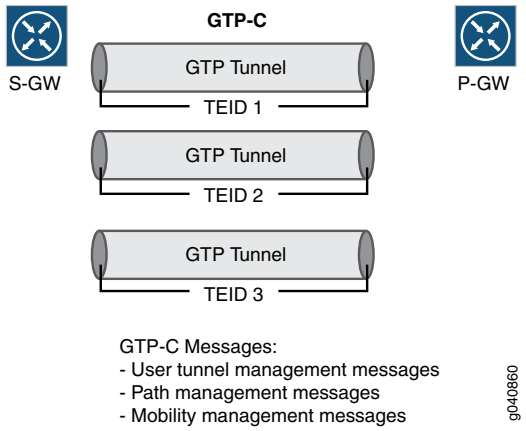
- Configuring General GTP Service on the S-GW on page 257

## Understanding Tunnel Endpoint Identifiers

The GPRS tunneling protocol (GTP) stack assigns a unique tunnel endpoint identifier (TEID) to each GTP control connection to the peers. The GTP stack also assigns a unique TEID to each GTP user connection (bearer) to the peers. The TEID is a 32-bit number field in the GTP (GTP-C or GTP-U) packet.

Figure 45 on page 233 shows a GTP tunnel with its associated TEID.

### Figure 45: GTP-C Performs Signaling Between the Serving Gateway and Packet Data Network Gateway




GTP-C allocates a TEID to identify a set of endpoints for a GTP-C tunnel, as shown in Figure 45 on page 233. For each bearer, a separate GTP-U tunnel with its own TEID is established.

An ingress Packet Forwarding Engine performs GTP-C TEID route lookup to identify the target services PIC for the received packet for the following types of GTP-C messages:

- Create PDP context request (for secondary)
- Update PDP context request and response (GTPv1)
- Delete PDP context request and response (GTPv1)
- Create Session response (GTPv2)
- Create bearer request and response (GTPv2)
- Modify bearer request and response (GTPv2)
- Delete Session request and response (GTPv2)
- Delete bearer request and response (GTPv2)

Each GTP-U tunnel is also assigned a TEID. For example, the GTP-U tunnel for a default bearer would have its own TEID.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- GTP Path Management Overview on page 224
- GTP Tunnel Management Overview on page 228
- Configuring General GTP Service on the S-GW on page 257

## Configuring GTP Services Overview

You can configure GPRS tunneling protocol (GTP) services on a MobileNext Broadband Gateway that is configured as a gateway GPRS support node (GGSN), Packet Data Network Gateway (P-GW), or GGSN/P-GW. At minimum, to configure a broadband gateway requires that you specify a loopback address on which GTP packets for the 3GPP interfaces are received. When configured as a GGSN, a broadband gateway uses only the Gn and Gp interfaces. When configured as a P-GW, a broadband gateway uses only S5 and S8 interfaces. When configured as a GGSN/P-GW, the broadband gateway uses all these 3GPP interfaces: Gn, Gp, S5, and S8.

This topic covers the following:

- GTP-C and GTP-U Path Management on page 234
- Configuring GTP Services at Different Levels on a Broadband Gateway on page 234
- GTP Services Default Settings on page 235
- GTP Version Support on page 236

### GTP-C and GTP-U Path Management

When you configure a Broadband Gateway, you can specify that GTP-C packets and GTP-U packets are received on different loopback addresses. GTP packets for a GTP-C peer address handle control packets, and GTP packets for a GTP-U peer address handle user (data) packets. Each peer in the GTP path is marked a GTP-C peer or a GTP-U peer, or both.

### Configuring GTP Services at Different Levels on a Broadband Gateway

When you configure a broadband gateway as a GGSN, P-GW, or GGSN/P-GW, GTP services can be configured at the following levels:

- Gateway—The mobile gateway appears as a single address, which comprises a loopback interface/IP address pair, and all GTP packets for the broadband gateway are received on this loopback address.

  NOTE: **To specify a single loopback address on which all GTP packets (GTP-C and GTP-U) are received, the Gn, Gp, S5, and S8 interfaces must be configured in the same VRF routing instance.**

- Control plane—GTP-C control (signaling) packets are received on a loopback address.

- Data plane—GTP-U data packets are received on a loopback address.
- 3GGP interface—GTP packets transported on the following 3G and 4G interfaces are received on a loopback address:
  - Gn interface—GTP packets on the Gn interface (3G) are received on a single loopback address. Optionally, GTP control or GTP user packets that are transported on the Gn interface also can be received on separate loopback addresses.
  - Gp interface—GTP packets are received on the Gp interface (3G). Optionally, GTP control or user packets that are transported on the Gp interface also can be received on separate loopback addresses.
  - S5 interface—GTP packets are received on the S5 interface (4G). Optionally, GTP control or user packets that are transported on the S5 interface also can be received on separate loopback addresses.
  - S8 interface—GTP packets are received on the S8 interface (4G). Optionally, GTP control or user packets that are transported on the S8 interface also can be received on separate loopback addresses.

If the Gn, Gp, S5, and S8 interfaces for the broadband gateway are each configured in a different Virtual Routing and Forwarding (VRF) routing instance, you must configure GTP services for each interface separately. In this case, each interface (GN, Gp, S5, and S8) must specify a different loopback interface. In addition, the IP address (that you specify for each loopback interface) must be the same in each VRF because the GTP-C, Mobility Management Entity (MME), and Home Subscriber Server (HSS) applications are not VRF aware and a mobile device could attach from anywhere.

## GTP Services Default Settings

To configure GTP services with all default settings on a P-GW, you can simply configure the loopback address on which GTP packets are received without explicitly configuring any other GTP statements. The GTP defaults configuration is automatically configured on the broadband gateway at the level that you specify the loopback address. For example, the following configuration statement shows a minimum but complete configuration for enabling GTP services on a P-GW:

```
[edit unified-edge mobile gateways ggsn-pgw pgw-1 gtp]
user@host# set interface lo0.0 v4-address 10.10.10.1
```

NOTE: If no address is specified for the interface, the broadband gateway uses the default interface IP address, which is configured under interface configuration.

When you do not explicitly configure path management options for GTP services, the broadband gateway uses the defaults, as described in "GTP Path Management Overview" on page 224.

When you do not explicitly configure tunnel management options for GTP services, the broadband gateway uses the defaults, as described in "GTP Tunnel Management Overview" on page 228.

### GTP Version Support

When you configure GTP services on the Broadband Gateway, the type of gateway you configure determines the GTP versions that the broadband gateway supports:

- A broadband gateway configured as a GGSN supports GTPv0 and GTPv1 packets
- A broadband gateway configured as a P-GW supports GTPv2 packets
- A broadband gateway configured as a GGSN/P-GW supports GTPv0, GTPv1, and GTPv2 packets

**Related Documentation**

- GPRS Tunneling Protocol (GTP) Overview on page 224
- GTP Path Management Overview on page 224
- GTP Tunnel Management Overview on page 228
- Configuring General GTP Service on the S-GW on page 257

## Configuring a Loopback Interface for Transport of GTP Packets

You must configure a loopback interface on an MX Series router before you can configure GTP services for Broadband Gateway.

To configure a loopback interface:

1. Edit the loopback interface.

   ```
   [edit]
   user@host# edit interfaces lo0
   ```

2. Edit the loopback interface unit.

   ```
   [edit interfaces lo0]
   user@host# set unit 1
   ```

3. Edit the loopback interface family.

   ```
   [edit interfaces lo0 unit 1]
   user@host# set family inet
   ```

4. Specify the loopback interface address.

   ```
   [edit interfaces lo0 unit 1 family inet]
   user@host# set address 10.10.10.1/32
   ```

**Related Documentation**

- Configuring GTP Services on a Broadband Gateway on page 237
- Configuring General GTP Service on the S-GW on page 257

## Configuring GTP Services on a Broadband Gateway

To configure a MobileNext Broadband Gateway as a GGSN/P-GW and enable GTP services, at minimum, you must configure a loopback interface and IP address on which GTP packets are received. Configuring GTP services on the GGSN/P-GW at the data plane, control plane, or (Gn, Gp, S5, or S8) interface level is optional.

The following configuration specifies a loopback address on which all GTP packets are received for the S5, S8, Gn, and Gp interfaces.

NOTE: To configure a loopback address on which all GTP packets are received, all 3GPP interfaces (S5, S8, Gn, and Gp) must be in the same VRF.

To configure GTP services on a broadband gateway configured as a GGSN/P-GW:

1. Configure the maximum number of peer entries for which the gateway stores statistics after the peer is deleted.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp]
   user@host# **set peer-history** ***1000***

   NOTE: In this configuration example, *ggsn-pgw* specifies the gateway personality and *MBG1* is the logical name of the gateway.

2. Configure an IPv4 address on a loopback interface to specify the transport address on which GTP-C and GTP-U packets are received for the S5, S8, Gn, and Gp interfaces.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp]
   user@host# **set interface** ***lo0.0*** **v4-address** ***10.10.10.1***

3. For tunnel management, configure the maximum number of times that the gateway will attempt to send signaling-request messages to a peer (SGSN or S-GW).

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp]
   user@host# **set n3-requests** ***6***

4. For tunnel management, configure the time that the gateway waits before resending a signaling-request message when a response to the request has not been received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp]
   user@host# **set t3-response** ***8***

5. For path management, configure the maximum number of times that the gateway will attempt to send echo-request messages to a peer (SGSN or S-GW).

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp]
   user@host# **set echo-n3-requests** ***6***

6. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp]
   user@host# **set echo-t3-response** ***4***

7. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received from the peer.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp]
   user@host# **set echo-interval *65***

8. Configure security trace options for the gateway:

   a. Specify a name for the file that receives the output of the tracing operation.

      [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp traceoptions]
      user@host# **set file *gtp_log***

   b. Configure the maximum size for the trace file.

      [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp traceoptions]
      user@host# **set size *50m***

   c. Configure the level of tracing to match all levels, including error conditions, informational messages, notice messages, verbose messages, and warning messages.

      [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp traceoptions]
      user@host# **set level *all***

   d. Configure the tracing operation to trace all operations.

      [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp traceoptions]
      user@host# **set flag *all***

**Related Documentation**

- Configuring a Loopback Interface for Transport of GTP Packets on page 236
- Configuring GTP Services on the Data Plane on page 240

  Configuring GTP Services on the Control Plane on page 238
- Configuring GTP Services Overview on page 234
- Configuring General GTP Service on the S-GW on page 257

## Configuring GTP Services on the Control Plane

To configure a separate address to receive GTP-C packets, you configure services on the router's loopback address. The following configuration specifies an IPv4 transport address on which GTP control packets other than Create Session request are received for the S5, S8, Gn, and Gp interfaces.

To configure GTP services on the control plane for a broadband gateway configured as a GGSN/P-GW:

1. Configure an IPv4 address on a loopback interface to specify the address on which GTP-C packets are received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp control]
   user@host# **set interface *lo0.0* v4-address *10.10.10.1***

2. For tunnel management, configure the maximum number of times that the gateway will attempt to send signaling-request messages to a peer (SGSN or S-GW).

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp control]
   user@host# **set n3-requests *6***

3. For tunnel management, configure the time that the gateway waits before resending a signaling-request message when a response to the request has not been received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp control]
   user@host# **set t3-response *8***

4. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to a peer (SGSN or S-GW).

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp control]
   user@host# **set echo-n3-requests *6***

5. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp control]
   user@host# **set echo-t3-response *4***

6. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received from the peer.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp control]
   user@host# **set echo-interval *65***

7. Specify a forwarding class for outbound control packets.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp]
   user@host# **set forwarding-class *assured-forwarding***

8. Specify a Differentiated Services Code Point (DSCP) value in the IP packet header for outbound control packets.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp]
   user@host# **set dscp-code-point *010110***

**Related Documentation**

- Configuring a Loopback Interface for Transport of GTP Packets on page 236
- Configuring GTP Services on the Data Plane on page 240
- Configuring GTP Services on a Broadband Gateway on page 237
- Configuring GTP Services Overview on page 234
- Configuring General GTP Service on the S-GW on page 257

## Configuring GTP Services on the Data Plane

On a Broadband Gateway, user data is transported through the GTP-U tunnel. To configure a separate address to receive GTP-U packets, you configure services on the router's loopback interface.

The following configuration specifies a separate address on which GTP-U packets are received for the S5, S8, Gn, and Gp interfaces, unless overridden at the 3GPP interface level.

To configure GTP services on the data plane for a broadband gateway configured as a GGSN/P-GW:

1. Configure an IPv4 address on a loopback interface to specify the transport address on which GTP-U packets are received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp data]
   user@host# **set interface *lo0.0* v4-address *10.10.10.1***

2. For tunnel management, configure the maximum number of times that the gateway will attempt to send signaling-request messages to a peer (SGSN or S-GW).

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp data]
   user@host# **set n3-requests *6***

3. For tunnel management, configure the time that the gateway waits before resending a signaling-request message when a response to the request has not been received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp data]
   user@host# **set t3-response *8***

4. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to a peer (SGSN or S-GW).

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp data]
   user@host# **set echo-n3-requests *6***

5. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp data]
   user@host# **set echo-t3-response *4***

6. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received from the peer.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp data]
   user@host# **set echo-interval *65***

7. Configure the number of seconds that the gateway waits before sending a TEID error message to the peer.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp data]
   user@host# **set error-indication-interval *5***

**Related Documentation**

- Understanding Tunnel Endpoint Identifiers on page 233
- Configuring a Loopback Interface for Transport of GTP Packets on page 236
- Configuring GTP Services on the Control Plane on page 238
- Configuring GTP Services on a Broadband Gateway on page 237
- Configuring GTP Services Overview on page 234
- Configuring General GTP Service on the S-GW on page 257

## Configuring GTP Services on the S5 Interface

The following configuration specifies a separate address on which GTP packets (other than Create Session request) are received for a 3GPP S5 interface.

The address you specify for an S5 interface must be the same address specified for the S8 interface although the VRF can be different. In addition, to allow mobility across 3G and Long Term Evolution (LTE), the S5 address must be the same as Gn and Gp addresses, optionally, with each interface in a different VRF, whether or not these addresses are specified explicitly or implicitly (through inheritance or from a higher level).

To configure GTP services on an S5 interface for a broadband gateway configured as a GGSN/P-GW:

1. Configure an IPv4 address on a loopback interface to specify the transport addresses on which GTP packets on the S5 interface are received.

   **[edit unified-edge mobile gateways ggsn-pgw MBG1 gtp s5]**
   **user@host# set interface *lo0.1* v4-address *10.10.10.1***

2. For tunnel management, configure the maximum number of times that the gateway will attempt to send signaling-request messages to a peer (SGSN or S-GW).

   **[edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp s5]**
   **user@host# set n3-requests *6***

3. For tunnel management, configure the time that the gateway waits before resending a signaling-request message when a response to the request has not been received.

   **[edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp s5]**
   **user@host# set t3-response *8***

4. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to a peer (SGSN or S-GW).

   **[edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp s5]**
   **user@host# set echo-n3-requests *6***

5. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

   **[edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp s5]**
   **user@host# set echo-t3-response *4***

6. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received from the peer.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp s5]
   user@host# **set echo-interval *65***

7. To configure a separate address on which GTP control packets are received for the S5 interface:

   a. Configure a loopback address to specify the address on which GTP control packets are received.

      [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp s5 control]
      user@host# **set interface *lo0.6* v4-address *10.10.10.2***

      NOTE: The path management and tunnel management configuration you specified at the S5 interface level will also apply to GTP control packets unless you configure path management, or tunnel management, or both at the S5 control level.

   b. To interoperate with older gateways that support a GTP version with 16-bit sequence-number-length, configure the following option.

      [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp s5 control]
      user@host# **set sequence-number-length*16-bits***

   c. Specify a forwarding class for outbound control packets.

      [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp s5 control]
      user@host# **set forwarding-class *assured-forwarding***

   d. Specify a DSCP value in the IP packet header for outbound control packets.

      [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp s5 control]
      user@host# **set dscp-code-point *010110***

**Related Documentation**

- Configuring a Loopback Interface for Transport of GTP Packets on page 236
- Configuring GTP Services on the S8 Interface on page 243
- Configuring GTP Services on the Data Plane on page 240
- Configuring GTP Services on the Control Plane on page 238
- Configuring GTP Services on a Broadband Gateway on page 237
- Configuring GTP Services Overview on page 234
- Configuring General GTP Service on the S-GW on page 257

## Configuring GTP Services on the S8 Interface

The following configuration specifies a separate address on which GTP packets (other than Create Session request) are received for a 3GPP S8 interface.

The address you specify for an S8 interface must be the same address specified for the S5 interface although the VRF can be different. In addition, to allow mobility across 3G and LTE, the S8 address must be the same as Gn and Gp addresses, whether or not these addresses are specified explicitly or implicitly (through inheritance or from a higher level).

To configure GTP services on an S8 interface for a broadband gateway configured as a GGSN/P-GW:

1. Configure an IPv4 address on a loopback interface to specify the transport address on which GTP packets are received for the S8 interface.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp s8]
   user@host# **set interface *lo0.0* v4-address *10.10.10.10***

2. For tunnel management, configure the maximum number of times that the gateway will attempt to send signaling-request messages to a peer (SGSN or S-GW).

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp s8]
   user@host# **set n3-requests *6***

3. For tunnel management, configure the time that the gateway waits before resending a signaling-request message when a response to the request has not been received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp s8]
   user@host# **set t3-response *8***

4. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to a peer (SGSN or S-GW).

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp s8]
   user@host# **set echo-n3-requests *6***

5. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp s8]
   user@host# **set echo-t3-response *4***

6. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received from the peer.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp s8]
   user@host# **set echo-interval *65***

7. To configure a separate address on which GTP data packets are received for the S8 interface:

   a. Configure a loopback address.

      [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp s8 data]
      user@host# **set interface *lo0.4* v4-address *10.1.1.8***

NOTE: The path management and tunnel management configuration you specified at the S8 interface level will also apply to GTP data packets unless you configure path management, or tunnel management, or both at the S8 interface data level.

**Related Documentation**

- Configuring a Loopback Interface for Transport of GTP Packets on page 236
- Configuring GTP Services on the S5 Interface on page 241
- Configuring GTP Services on the Data Plane on page 240
- Configuring GTP Services on the Control Plane on page 238
- Configuring GTP Services on a Broadband Gateway on page 237
- Configuring GTP Services Overview on page 234
- Configuring General GTP Service on the S-GW on page 257

## Configuring GTP Services on the Gn Interface

The following configuration specifies the loopback address on which GTP packets are received for a Gn interface.

The IP address you specify for a Gn interface must be the same address that is specified for the Gp interface, although the Gn and Gp interfaces can be in different VRFs. In addition, to support mobility across 3G and 4G networks, the Gn IP address must be the same as the S5 and S8 addresses, optionally, with each interface in a different VRF, whether or not these addresses are specified explicitly or implicitly (through inheritance or from a higher level).

To configure GTP services on a Gn interface for a broadband gateway configured as a GGSN/P-GW:

1. Configure an IPv4 address on a loopback interface to specify the transport address on which GTP packets on the Gn interface are received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp gn]
   user@host# **set interface *lo0.0* v4-address *10.10.10.1***

2. For tunnel management, configure the maximum number of times that the gateway will attempt to send signaling-request messages to a peer (SGSN or S-GW).

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp gn]
   user@host# **set n3-requests *6***

3. For tunnel management, configure the time that the gateway waits before resending a signaling-request message when a response to the request has not been received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp gn]
   user@host# **set t3-response *8***

4. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to a peer (SGSN or S-GW).

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp gn]
   user@host# **set echo-n3-requests *6***

5. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp gn]
   user@host# **set echo-t3-response *4***

6. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received from the peer.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp gn]
   user@host# **set echo-interval *65***

7. To configure a separate loopback address on which GTP control packets are received for the Gn interface:

   a. Configure an IPv4 address on a loopback interface to specify the transport addresses on which GTP control packets on the Gn interface are received.

      [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp gn control]
      user@host# **set interface *lo0.5* v4-address *10.10.10.2***

      NOTE: The path management and tunnel management configuration you specified at the Gn interface level will also apply to GTP control packets unless you configure path management, or tunnel management, or both at the Gn interface control level.

   b. Specify a forwarding class for outbound control packets.

      [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp gn control]
      user@host# **set forwarding-class *assured-forwarding***

   c. Specify a DSCP value in the IP packet header for outbound control packets.

      [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp gn control]
      user@host# **set dscp-code-point *010110***

**Related Documentation**

- Configuring a Loopback Interface for Transport of GTP Packets on page 236
- Configuring GTP Services on the Gp Interface on page 246
- Configuring GTP Services on the Data Plane on page 240
- Configuring GTP Services on the Control Plane on page 238
- Configuring GTP Services on a Broadband Gateway on page 237
- Configuring GTP Services Overview on page 234
- Configuring General GTP Service on the S-GW on page 257

## Configuring GTP Services on the Gp Interface

The following configuration specifies a separate address on which GTP packets are received for a 3GPP Gp interface.

The IP address you specify for a Gp interface must be the same address that is specified for the Gn interface, although the Gp and Gn interfaces can be in different VRFs. In addition, to allow mobility across 3G and 4G networks, the Gp IP address must be the same as the S5 and S8 addresses (optionally, with each interface in a different VRF) whether or not these addresses are configured explicitly or implicitly (through inheritance or from a higher level).

To configure GTP services on a Gp interface for a broadband gateway configured as a GGSN/P-GW:

1. Configure an IPv4 address on a loopback interface to specify the transport address on which GTP packets on the Gp interface are received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp gp]
   user@host# **set interface *lo0.0* v4-address *10.10.10.1***

2. For tunnel management, configure the maximum number of times that the gateway will attempt to send signaling-request messages to a peer (SGSN or S-GW).

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp gp]
   user@host# **set n3-requests *6***

3. For tunnel management, configure the time that the gateway waits before resending a signaling-request message when a response to the request has not been received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp gp]
   user@host# **set t3-response *8***

4. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to a peer (SGSN or S-GW).

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp gp]
   user@host# **set echo-n3-requests *6***

5. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp gp]
   user@host# **set echo-t3-response *4***

6. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received from the peer.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp gp]
   user@host# **set echo-interval *65***

7. To configure a separate loopback address on which GTP control packets are received for the Gp interface:

   a. Configure an IPv4 address on a loopback interface to specify the transport addresses on which GTP control packets on the Gp interface are received.

```
[edit unified-edge mobile gateways ggsn-pgw MBG1 gtp gp control]
user@host# set interface lo0.5 v4-address 10.10.10.2
```

NOTE: The path management and tunnel management configuration you specified at the Gp interface level will also apply to GTP control packets unless you configure path management, or tunnel management, or both at the Gp interface control level.

b. Specify a forwarding class for outbound control packets.

```
[edit unified-edge mobile gateways ggsn-pgw MBG1 gtp gp control]
user@host# set forwarding-class assured-forwarding
```

c. Specify a DSCP value in the IP packet header for outbound control packets.

```
[edit unified-edge mobile gateways ggsn-pgw MBG1 gtp gp control]
user@host# set dscp-code-point 010110
```

**Related Documentation**

- Configuring a Loopback Interface for Transport of GTP Packets on page 236
- Configuring GTP Services on the Gn Interface on page 244
- Configuring GTP Services on the Data Plane on page 240
- Configuring GTP Services on the Control Plane on page 238
- Configuring GTP Services on a Broadband Gateway on page 237
- Configuring GTP Services Overview on page 234
- Configuring General GTP Service on the S-GW on page 257

## Configuring GTP Services When the S5 and S8 Interfaces Are in Different VRFs

To configure GTP services on a MobileNext Broadband Gateway configured as a P-GW, you specify a different loopback interface but same IP address for each interface when the S5 and S8 interfaces are in different VRF routing instances.

To configure GTP services for a broadband gateway configured as a P-GW when the S5 and S8 interfaces are in different VRFs:

1. Configure the maximum number of peer entries for which the gateway stores statistics collected for deleted peers.

```
[edit unified-edge mobile gateways ggsn-pgw pgw-1 gtp]
user@host# set peer-history 1000
```

2. For tunnel management, configure the maximum number of times that the gateway will attempt to send signaling-request messages to a peer (S-GW).

```
[edit unified-edge mobile gateways ggsn-pgw pgw-1 gtp]
user@host# set n3-requests 6
```

3. For tunnel management, configure the time that the gateway waits before resending a signaling-request message when a response to the request has not been received.

```
[edit unified-edge mobile gateways ggsn-pgw pgw-1 gtp]
user@host# set t3-response 8
```

4. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to a peer (SGSN or S-GW).

```
[edit unified-edge mobile gateways ggsn-pgw pgw-1 gtp]
user@host# set echo-n3-requests 6
```

5. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

```
[edit unified-edge mobile gateways ggsn-pgw pgw-1 gtp]
user@host# set echo-t3-response 4
```

6. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received from the peer.

```
[edit unified-edge mobile gateways ggsn-pgw pgw-1 gtp]
user@host# set echo-interval 65
```

7. Configure a loopback interface and IP address to specify the transport address on which all GTP packets transported on the S5 interface are received.

```
[edit unified-edge mobile gateways ggsn-pgw pgw-1 gtp s5]
user@host# set interface lo0.1 v4-address 10.10.10.10
```

NOTE: This interface uses lo0.1.

8. Configure a loopback interface and IP address to specify the transport address on which all GTP packets transported on the S8 interface are received.

```
[edit unified-edge mobile gateways ggsn-pgw pgw-1 gtp s8]
user@host# set interface lo0.2 v4-address 10.10.10.10
```

NOTE: This interface uses lo0.2.

9. Configure security trace options for the gateway:

   a. Specify a name for the file that receives the output of the tracing operation.

```
[edit unified-edge mobile gateways ggsn-pgw pgw-1 gtp traceoptions]
user@host# set file gtp_log
```

   b. Configure the maximum size for the trace file.

```
[edit unified-edge mobile gateways ggsn-pgw pgw-1 gtp traceoptions]
user@host# set size 50m
```

**Related Documentation**

- Configuring a Loopback Interface for Transport of GTP Packets on page 236
- Configuring GTP Services on the Data Plane on page 240
- Configuring GTP Services on the Control Plane on page 238

- Configuring GTP Services on a Broadband Gateway on page 237
- Configuring GTP Services Overview on page 234
- Configuring General GTP Service on the S-GW on page 257

## Configuring GTP Services When the S5 and S8 Interfaces Are in the Same VRF

When the interfaces are in the same VRF routing instances, you specify a single loopback interface IP address for the S5 and S8 interfaces.

To configure GTP services for a MobileNext Broadband Gateway configured as a P-GW when the S5 and S8 interfaces are in the same VRF:

1. Configure the maximum number of peer entries for which the gateway stores statistics collected for deleted peers.

   [edit unified-edge mobile gateways ggsn-pgw *pgw-vrf-green* gtp]
   user@host# **set peer-history 1000**

2. For tunnel management, configure the maximum number of times that the gateway will attempt to send signaling-request messages to a peer (SGSN or S-GW).

   [edit unified-edge mobile gateways ggsn-pgw *pgw-vrf-green* gtp]
   user@host# **set n3-requests *6***

3. For tunnel management, configure the time that the gateway waits before resending a signaling-request message when a response to the request has not been received.

   [edit unified-edge mobile gateways ggsn-pgw *pgw-vrf-green* gtp]
   user@host# **set t3-response *8***

4. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to a peer (SGSN or S-GW).

   [edit unified-edge mobile gateways ggsn-pgw *pgw-vrf-green* gtp]
   user@host# **set echo-n3-requests *6***

5. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

   [edit unified-edge mobile gateways ggsn-pgw *pgw-vrf-green* gtp]
   user@host# **set echo-t3-response *4***

6. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received from the peer.

   [edit unified-edge mobile gateways ggsn-pgw *pgw-vrf-green* gtp]
   user@host# **set echo-interval *65***

7. Configure a loopback interface and IP address to specify the transport address on which all GTP packets transported on the S5 interface are received

   [edit unified-edge mobile gateways ggsn-pgw *pgw-vrf-green* gtp s5]
   user@host# **set interface *lo0.1* v4-address *10.10.10.10***

NOTE: This interface uses lo0.1.

8. Configure a loopback interface and IP address to specify the transport address on which all GTP packets transported on the S8 interface are received

   [edit unified-edge mobile gateways ggsn-pgw *pgw-vrf-green* gtp s8]
   user@host# **set interface *lo0.1* v4-address *10.10.10.10***

NOTE: This interface also uses lo0.1.

9. Configure security trace options for the gateway:

   a. Specify a name for the file that receives the output of the tracing operation.

      [edit unified-edge mobile gateways ggsn-pgw *pgw-vrf-green* gtp traceoptions]
      user@host# **set file *gtp_log***

   b. Configure the maximum size for the trace file.

      [edit unified-edge mobile gateways ggsn-pgw *pgw-vrf-green* gtp traceoptions]
      user@host# **set size *50m***

**Related Documentation**

- Configuring a Loopback Interface for Transport of GTP Packets on page 236
- Configuring GTP Services on the Data Plane on page 240
- Configuring GTP Services on the Control Plane on page 238
- Configuring GTP Services on a Broadband Gateway on page 237
- Configuring GTP Services Overview on page 234
- Configuring General GTP Service on the S-GW on page 257

## Configuring GTP Services When 3GPP Interfaces Are in Different VRFs

To configure GTP services on a MobileNext Broadband Gateway when the Gn , Gp, S5, and S8 interfaces are in different VRFs, you configure each interface with a different loopback interface but must specify the same IP address for the Gn , Gp, S5, and S8 interfaces.

In this example configuration, the same GTP services configuration is applied across the Gn, Gp, S5, and S8 interfaces. However, for each interface, GTP packets will be received on a separate loopback interface but specifying the same IP address.

To configure GTP services for a broadband gateway configured as a GGSN/P-GW on which the interfaces use different VRFs:

1. Configure the maximum number of peer entries for which the gateway stores statistics collected for deleted peers.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp]

```
user@host# set peer-history 1000
```

2. For tunnel management, configure the maximum number of times that the gateway will attempt to send signaling-request messages to a peer (SGSN or S-GW).

```
[edit unified-edge mobile gateways ggsn-pgw MBG1 gtp]
user@host# set n3-requests 6
```

3. For tunnel management, configure the time that the gateway waits before resending a signaling-request message when a response to the request has not been received.

```
[edit unified-edge mobile gateways ggsn-pgw MBG1 gtp]
user@host# set t3-response 8
```

4. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to a peer (SGSN or S-GW).

```
[edit unified-edge mobile gateways ggsn-pgw MBG1 gtp]
user@host# set echo-n3-requests 6
```

5. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

```
[edit unified-edge mobile gateways ggsn-pgw MBG1 gtp]
user@host# set echo-t3-response 4
```

6. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received from the peer.

```
[edit unified-edge mobile gateways ggsn-pgw MBG1 gtp]
user@host# set echo-interval 65
```

7. Configure a loopback interface and IP address to specify the transport address on which all GTP packets transported on the S5 interface are received.

```
[edit unified-edge mobile gateways ggsn-pgw MBG1 gtp s5]
user@host# set interface lo0.1 v4-address 10.10.10.10
```

8. Configure a loopback interface and IP address to specify the transport address on which all GTP packets transported on the S8 interface are received.

```
[edit unified-edge mobile gateways ggsn-pgw MBG1 gtp s8]
user@host# set interface lo0.2 v4-address 10.10.10.10
```

9. Configure a loopback interface and IP address to specify the transport address on which all GTP packets transported on the Gn interface are received.

```
[edit unified-edge mobile gateways ggsn-pgw MBG1 gtp gn]
user@host# set interface lo0.3 v4-address 10.10.10.10
```

10. Configure a loopback interface and IP address to specify the transport address on which all GTP packets transported on the Gp interface are received.

```
[edit unified-edge mobile gateways ggsn-pgw MBG1 gtp gp]
user@host# set interface lo0.4 v4-address 10.10.10.10
```

11. Configure security trace options for the gateway:

    a. Specify a name for the file that receives the output of the tracing operation.

```
[edit unified-edge mobile gateways ggsn-pgw MBG1 gtp traceoptions]
```

```
user@host# set file gtp_log
```

b. Configure the maximum size for the trace file.

```
[edit unified-edge mobile gateways ggsn-pgw MBG1 gtp traceoptions]
user@host# set size 50m
```

**Related Documentation**

- Configuring a Loopback Interface for Transport of GTP Packets on page 236
- Configuring GTP Services on the Data Plane on page 240
- Configuring GTP Services on the Control Plane on page 238
- Configuring GTP Services on a Broadband Gateway on page 237
- Configuring GTP Services Overview on page 234
- Configuring General GTP Service on the S-GW on page 257

## Configuring GTP Services on a GGSN Broadband Gateway

When you configure GTP services on a MobileNext Broadband Gateway configured as a GGSN, you can optionally specify a different address on which GTP control or data packets are received for the Gn and Gp interfaces.

In this example 3G configuration, the Gn and Gp interfaces are in the same VRF routing instance. The Gn interface configuration specifies that GTP-C and GTP-U packets (on the Gn interface) are each received on a different transport address. The Gp interface configuration specifies that all GTP packets (on the Gp interface) are received on a single transport address.

To configure GTP services for a broadband gateway configured as a GGSN:

1. Configure the maximum number of peer entries for which the gateway stores statistics collected for deleted peers.

```
[edit unified-edge mobile gateways ggsn-pgw ggsn-1 gtp]
user@host# set peer-history 1000
```

2. For tunnel management, configure the maximum number of times that the gateway will attempt to send signaling-request messages to a peer (SGSN or S-GW).

```
[edit unified-edge mobile gateways ggsn-pgw ggsn-1 gtp]
user@host# set n3-requests 6
```

3. For tunnel management, configure the time that the gateway waits before resending a signaling-request message when a response to the request has not been received.

```
[edit unified-edge mobile gateways ggsn-pgw ggsn-1 gtp]
user@host# set t3-response 8
```

4. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to a peer (SGSN or S-GW).

```
[edit unified-edge mobile gateways ggsn-pgw ggsn-1 gtp]
user@host# set echo-n3-requests 6
```

5. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

   [edit unified-edge mobile gateways ggsn-pgw *ggsn-1* gtp]
   user@host# **set echo-t3-response** *4*

6. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received from the peer.

   [edit unified-edge mobile gateways ggsn-pgw *ggsn-1* gtp]
   user@host# **set echo-interval** *65*

7. Configure a loopback address to specify the transport address on which GTP packets transported on the Gn interface are received.

   [edit unified-edge mobile gateways ggsn-pgw *ggsn-1* gtp gn]
   user@host# **set interface** *lo0.1* **v4-address** *10.10.10.10*

8. Configure a loopback address to specify a different transport address on which GTP data packets transported on the Gn interface are received.

   [edit unified-edge mobile gateways ggsn-pgw *ggsn-1* gtp gn data]
   user@host# **set interface** *lo0.1* **v4-address** *10.10.10.20*

9. Configure a loopback interface and IP address to specify the transport address on which all GTP packets transported on the Gp interface are received.

   [edit unified-edge mobile gateways ggsn-pgw *ggsn-1* gtp gp]
   user@host# **set interface** *lo0.1* **v4-address** *10.10.10.30*

**Related Documentation**

- Configuring a Loopback Interface for Transport of GTP Packets on page 236
- Configuring GTP Services Overview on page 234
- Configuring GTP Services on the Data Plane on page 240
- Configuring GTP Services on the Control Plane on page 238
- Configuring GTP Services on a Broadband Gateway on page 237
- Configuring GTP Services When 3GPP Interfaces Are in Different VRFs on page 250
- Configuring General GTP Service on the S-GW on page 257

## Configuring GTP Services on a Peer Group

You can configure GTP services to overwrite default configurations for a group of SGSN or S-GW peers.

To configure GTP services on a peer group:

1. Specify a name for the peer group.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp]
   user@host# **edit peer-groups** *peer-grp-1*

2. Specify the name of the routing instance to which all peers in the peer group belong.

[edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp peer-groups *peer-grp-1*]
user@host# **set routing-instance *vrf-instance-peers-green***

3. Configure the IP addresses for the peers in the peer group.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp peer-groups *peer-grp-1*]
   user@host# **set peer 22.1.1.10/16**

4. For tunnel management, configure the maximum number of times that the gateway will attempt to send signaling-request messages to a peer (SGSN or S-GW).

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp peer-groups *peer-grp-1*]
   user@host# **set n3-requests *6***

5. For tunnel management, configure the time that the gateway waits before resending a signaling-request message when a response to the request has not been received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp peer-groups *peer-grp-1*]
   user@host# **set t3-response *8***

6. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to a peer (SGSN or S-GW).

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp peer-groups *peer-grp-1*]
   user@host# **set echo-n3-requests *6***

7. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp peer-groups *peer-grp-1*]
   user@host# **set echo-t3-response *4***

8. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received from the peer.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp peer-groups *peer-grp-1*]
   user@host# **set echo-interval *65***

9. Configure the peer gateways to transport a 16-bit sequence number when GTP control packets are sent to and received from the peer gateways.

   [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp peer-groups *peer-grp-1* control]
   user@host# **set sequence-number-length *16-bits***

**Related Documentation**

- Configuring a Loopback Interface for Transport of GTP Packets on page 236
- Configuring GTP Services on the Data Plane on page 240
- Configuring GTP Services on the Control Plane on page 238
- Configuring GTP Services on a Broadband Gateway on page 237
- Configuring GTP Services Overview on page 234
- Configuring General GTP Service on the S-GW on page 257

## Disabling Path Management on a Broadband Gateway or Peer Group

You can temporarily disable path management on the MobileNext Broadband Gateway so that echo-request messages are not sent from the P-GW to a peer.

When you configure the broadband gateway as a P-GW, the path management options are automatically enabled using the default echo-timing values. You can configure the **path-management** option to temporarily disable path management on the entire gateway, or on the control plane, data plane, or interface (S5, S8, Gn, or Gp) level.

- To disable path management on the Broadband Gateway:

  [edit unified-edge mobile gateways ggsn-pdn-gateway *MBG1* gtp
  user@host# **set path-management *disable***

  To enable echo-request processing again on the GGSN/P-GW:

  [edit unified-edge mobile gateways ggsn-pdn-gateway *MBG1* gtp
  user@host# **set path-management *enable***

- To disable path management on a peer group:

  [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp peer-groups *peer-grp-1*]
  user@host# **set path-management *disable***

  To enable path management again on the peer group:

  [edit unified-edge mobile gateways ggsn-pgw *MBG1* gtp peer-groups *peer-grp-1*]
  user@host# **set path-management *enable***

**Related Documentation**

- GTP Path Management Overview on page 224
- Configuring GTP Services Overview on page 234
- Configuring General GTP Service on the S-GW on page 257

## Configuring GTP Trace Options

GTP tracing operations record detailed messages about the operation of GTP services on the Broadband Gateway, such as the various types of GTP packets sent and received, GTP peer-related events, GTP tracker-related events, configuration information, and debug information. You can specify which trace operations are logged by including specific tracing flags and levels.

Table 37 on page 255 describes the flags that you can include.

### Table 37: Trace Flags

| Flag | Description |
|---|---|
| **all** | Trace everything. |
| **config** | Trace configuration-related information. |
| **debug** | Trace debug information. |

Table 37: Trace Flags *(continued)*

| | |
|---|---|
| **decode** | Trace decoding of received packets. |
| **encode** | Trace encoding of transmitted packets. |
| **events** | Trace all internal and external events. |
| **packet-io** | Trace transmitted and received packets. |
| **peer** | Trace decoding of received packets. |
| **tracker** | Trace GTP peer-related events. |
| **warning** | Trace warnings. |

Table 38 on page 256 describes the levels you can include.

Table 38: Trace Levels

| Level | Description |
|---|---|
| **all** | Match all levels. |
| **error** | Match error conditions. |
| **info** | Match informational messages. |
| **notice** | Match conditions that should be specially handled. |
| **verbose** | Match verbose messages. |
| **warning** | Match warning messages. |

To configure tracing options for GTP operations:

1. Specify that you want to configure tracing options for GTP operations.

   [edit unified-edge gateways ggsn-pgw *pgw-1* gtp]
   user@host# **edit traceoptions**

2. Configure the filename for the trace file.

   [edit unified-edge mobile gateways ggsn-pgw *pgw-1* gtp trace-options]
   user@host# **set file *gtp-log***

3. (Optional) Configure the maximum size of each trace file.

   [edit unified-edge mobile gateways ggsn-pgw *pgw-1* gtp trace-options]
   user@host# **set file size 100m**

4. Configure tracing flags.

   [edit unified-edge mobile gateways ggsn-pgw *pgw-1* gtp s5 trace-options]
   user@host# **set flag all**

5. Configure the tracing level.

   [edit unified-edge mobile gateways ggsn-pgw *pgw-1* gtp s5 trace-options]
   user@host# **set level error**

6. View the trace file.

   user@host# **file show /var/log/gtp-log**

**Related Documentation**

- Configuring GTP Services Overview on page 234
- Configuring General GTP Service on the S-GW on page 257

## Configuring General GTP Service on the S-GW

The following configuration specifies the general parameters for the GPRS Tunneling Protocol (GTP) for a Serving Gateway (S-GW) configured on the MobileNext Broadband Gateway. GTP includes control (GTP-C) version 2 and GTP, user (GTP-U) payloads inside UDP datagrams. Parameters configured at the more specific hierarchy level override those configured at a more general hierarchy level.

You can configure many of the same parameters for GTP-C (**control**) and GTP-U (**data**) payloads as at the GTP (**gtp**) hierarchy level. When configured as separate control or data parameters, these values override the values configured at the **gtp** hierarchy level.

You can configure the following parameters at multiple GTP hierarchy levels:

- **echo-interval**
- **echo-n3-requests**
- **echo-t3-response**
- **interface**
- **n3-requests** (except data level)
- **path-management**
- **t3-response** (except data level)

To configure GTP services for a broadband gateway configured as an S-GW called MBG2:

1. Configure the maximum number of GTP peers for which statistics are stored in the GTP history.

   [edit unified-edge mobile gateways sgw MBG2 gtp]
   user@host# **set peer-history *100***

   NOTE: You can set the peers for which statistics are stored from 1 to 1000. There is no default value.

2. Configure an interface to use for GTP packets. If the interface has more than one IP address, specify which address to use.

```
[edit unified-edge mobile gateways sgw MBG2 gtp]
[edit unified-edge mobile gateways sgw MBG2 gtp control]
[edit unified-edge mobile gateways sgw MBG2 gtp data]
user@host# set interface lo0.2 v4-address 10.10.10.2
```

3. (Optional) Disable or enable path management.

```
[edit unified-edge mobile gateways sgw MBG2 gtp]
[edit unified-edge mobile gateways sgw MBG2 gtp control]
[edit unified-edge mobile gateways sgw MBG2 gtp data]
user@host# set path-management disable
```

NOTE: Control path management is enabled by default for the GTP control plane (GTP-C), but disabled by default for the GTP user plane (GTP-U).

4. For tunnel management, configure the maximum number of times that the gateway will attempt to send signaling-request messages to a remote control peer.

```
[edit unified-edge mobile gateways sgw MBG2 gtp]
[edit unified-edge mobile gateways sgw MBG2 gtp control]
user@host# set n3-requests 6
```

NOTE: This parameter cannot be set for data (GTP-U).

5. For tunnel management, configure the time that the gateway waits before resending a signaling-request message when a response to the request has not been received.

```
[edit unified-edge mobile gateways sgw MBG2 gtp]
[edit unified-edge mobile gateways sgw MBG2 gtp control]
user@host# set t3-response 8
```

NOTE: This parameter cannot be set for data (GTP-U).

6. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to a remote control peer.

```
[edit unified-edge mobile gateways sgw MBG2 gtp]
[edit unified-edge mobile gateways sgw MBG2 gtp control]
[edit unified-edge mobile gateways sgw MBG2 gtp data]
user@host# set echo-n3-requests 6
```

7. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

```
[edit unified-edge mobile gateways sgw MBG2 gtp]
[edit unified-edge mobile gateways sgw MBG2 gtp control]
[edit unified-edge mobile gateways sgw MBG2 gtp data]
user@host# set echo-t3-response 4
```

8. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received from the peer.

```
[edit unified-edge mobile gateways sgw MBG2 gtp]
[edit unified-edge mobile gateways sgw MBG2 gtp control]
[edit unified-edge mobile gateways sgw MBG2 gtp data]
user@host# set echo-interval 65
```

9. To configure parameters for GTP-U data packets:

   a. Specify the error indication interval.

   ```
   [edit unified-edge mobile gateways sgw MBG2 gtp data]
   user@host# set error-indication-interval 5
   ```

   NOTE: You can set the error indication interval from 1 to 20 seconds. The default value is 1 second.

   b. (Optional) Enable the indirect tunnel feature.

   ```
   [edit unified-edge mobile gateways sgw MBG2 gtp data]
   user@host# set indirect-tunnel
   ```

   NOTE: The indirect tunnel feature is enabled by default.

10. To configure parameters for GTP-C control packets:

   a. (Optional) Disable the GTP response cache.

   ```
   [edit unified-edge mobile gateways sgw MBG2 gtp control]
   user@host# set no-response-cache
   ```

   NOTE: The GTP response cache is enabled by default.

   b. (Optional) Specify a response cache timeout value for cached GTP response packets.

   ```
   [edit unified-edge mobile gateways sgw MBG2 gtp control]
   user@host# set response-cache-timeout 10
   ```

   NOTE: You can set the response cache timer from 5 to 20 seconds.

   c. Specify a forwarding class for outbound control packets.

   ```
   [edit unified-edge mobile gateways sgw MBG2 gtp control]
   user@host# set forwarding-class assured-forwarding
   ```

   d. Specify a DSCP value in the IP packet header for outbound control packets.

   ```
   [edit unified-edge mobile gateways sgw MBG2 gtp control]
   user@host# set dscp-code-point 010110
   ```

   e. Enable or disable the downlink data notification delay synchronization across service PICs.

```
[edit unified-edge mobile gateways sgw MBG2 gtp control]
user@host# set ddn-delay-sync
```

NOTE: By default, downlink data notification delay synchronization is enabled.

f. Specify a time-to-live (TTL) value to be used in the GTP-C packets.

```
[edit unified-edge mobile gateways sgw MBG2 gtp control]
user@host# set ttl-value 1
```

NOTE: By default, the TTL value is 255. You can set any value from 1 to 255.

**Related Documentation**

- GPRS Tunneling Protocol (GTP) Overview on page 224
- Configuring GTP Services on the S4 Interface on page 265
- Configuring GTP-C Services on the S11 Interface on page 260
- Configuring GTP-U Services on the S12 Interface on page 262
- Configuring GTP Services on the S1-U Interface on page 264
- Example: Configuring GTP for the S-GW When Interfaces Are in different VRFs on page 273

## Configuring GTP-C Services on the S11 Interface

The following configuration specifies the parameters for a 3GPP S11 interface on the MobileNext Broadband Gateway. The S11 interface is between the Serving Gateway (S-GW) and the Mobility Management Entity (MME). The S11 interface processes GPRS tunneling protocol, control (GTP-C) version 2 payloads inside UDP datagrams.

You can configure many of the same parameters for the GTP (**gtp**) hierarchy level and the S11 (**s11**) interface hierarchy level. When configured as separate GTP or interface parameters, the values at the S11 (**s11**) hierarchy level override the values configured at the GTP (**gtp**) hierarchy level.

You can configure the following parameters at the GTP and S11 hierarchy levels:

- **echo-interval**
- **echo-n3-requests**
- **echo-t3-response**
- **interface**
- **n3-requests**

- **path-management**
- **t3-response**

To configure GTP-Cv2 services on an S11 interface for a broadband gateway configured as a S-GW named MBG2:

1. Configure an IPv4 address on a loopback interface to specify the transport addresses on which GTP-Cv2 packets on the S11 interface are received.

   [edit unified-edge mobile gateways sgw *MBG2* gtp]
   [edit unified-edge mobile gateways sgw *MBG2* gtp s11]
   user@host# **set interface *lo0.2* v4-address *10.10.10.1***

2. Specify a DSCP value in the IP packet header for outbound control packets.

   [edit unified-edge mobile gateways sgw *MBG2* gtp s11]
   user@host# **set dscp-code-point *010110***

3. Specify a time-to-live (TTL) value to be used in the GTP-C packets.

   [edit unified-edge mobile gateways sgw *MBG2* gtp s11]
   user@host# **set ttl-value *1***

   NOTE: By default, the TTL value is 255. You can set any value from 1 to 255.

4. Optionally, disable or enable path management.

   [edit unified-edge mobile gateways sgw *MBG2* gtp]
   [edit unified-edge mobile gateways sgw *MBG2* gtp s11]
   user@host# **set path-management disable**

   NOTE: Path management is enabled by default.

5. For tunnel management, configure the maximum number of times that the gateway will attempt to send signaling-request messages to an MME.

   [edit unified-edge mobile gateways sgw *MBG2* gtp]
   [edit unified-edge mobile gateways sgw *MBG2* gtp s11]
   user@host# **set n3-requests *6***

6. For tunnel management, configure the time that the gateway waits before resending a signaling-request message when a response to the request has not been received.

   [edit unified-edge mobile gateways sgw *MBG2* gtp]
   [edit unified-edge mobile gateways sgw *MBG2* gtp s11]
   user@host# **set t3-response *8***

7. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to an MME.

   [edit unified-edge mobile gateways sgw *MBG2* gtp]
   [edit unified-edge mobile gateways sgw *MBG2* gtp s11]
   user@host# **set echo-n3-requests *6***

8. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

   [edit unified-edge mobile gateways sgw *MBG2* gtp]
   [edit unified-edge mobile gateways sgw *MBG2* gtp s11]
   user@host# **set echo-t3-response** *4*

9. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received from the MME.

   [edit unified-edge mobile gateways sgw *MBG2* gtp]
   [edit unified-edge mobile gateways sgw *MBG2* gtp s11]
   user@host# **set echo-interval** *65*

**Related Documentation**

- GPRS Tunneling Protocol (GTP) Overview on page 224
- Configuring General GTP Service on the S-GW on page 257
- Configuring GTP Services on the S4 Interface on page 265
- Configuring GTP-U Services on the S12 Interface on page 262
- Configuring GTP Services on the S1-U Interface on page 264
- Example: Configuring GTP for the S-GW When Interfaces Are in different VRFs on page 273

## Configuring GTP-U Services on the S12 Interface

The following configuration specifies the parameters for a 3GPP S12 interface on the MobileNext Broadband Gateway. The S12 interface is between the Serving Gateway (S-GW) and a 3G mobile radio network, specifically, the Radio Network Controller (RNC). The S12 interface processes GPRS tunneling protocol, user (GTP-U) payloads inside UDP datagrams.

You can configure many of the same parameters for the GTP (**gtp**) hierarchy level and the S12 (**s12**) interface hierarchy level. When configured as separate GTP or interface parameters, the values at the S12 (**s12**) hierarchy level override the values configured at the GTP (**gtp**) hierarchy level.

You can configure the following parameters at the GTP and S12 hierarchy levels:

- **echo-interval**
- **echo-n3-requests**
- **echo-t3-response**
- **interface**
- **path-management**

To configure GTP-U services on an S12 interface for a broadband gateway configured as an S-GW named MBG2:

1. Configure an IPv4 address on a loopback interface to specify the transport addresses on which GTP-U packets on the S12 interface are received.

   [edit unified-edge mobile gateways sgw *MBG2* gtp]
   [edit unified-edge mobile gateways sgw *MBG2* gtp s12]
   user@host# **set interface *lo0.2* v4-address *10.10.10.2***

2. (Optional) Enable path management.

   [edit unified-edge mobile gateways sgw *MBG2* gtp]
   [edit unified-edge mobile gateways sgw *MBG2* gtp s12]
   user@host# **set path-management enable**

   NOTE: **Path management on the S12 interface is disabled by default.**

3. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to an RNC.

   [edit unified-edge mobile gateways sgw *MBG2* gtp]
   [edit unified-edge mobile gateways sgw *MBG2* gtp s12]
   user@host# **set echo-n3-requests *6***

4. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

   [edit unified-edge mobile gateways sgw *MBG2* gtp]
   [edit unified-edge mobile gateways sgw *MBG2* gtp s12]
   user@host# **set echo-t3-response *4***

5. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received.

   [edit unified-edge mobile gateways sgw *MBG2* gtp]
   [edit unified-edge mobile gateways sgw *MBG2* gtp s12]
   user@host# **set echo-interval *65***

**Related Documentation**

- GPRS Tunneling Protocol (GTP) Overview on page 224
- Configuring General GTP Service on the S-GW on page 257
- Configuring GTP Services on the S4 Interface on page 265
- Configuring GTP-C Services on the S11 Interface on page 260
- Configuring GTP Services on the S1-U Interface on page 264
- Example: Configuring GTP for the S-GW When Interfaces Are in different VRFs on page 273

## Configuring GTP Services on the S1-U Interface

The following configuration specifies the parameters for a 3GPP S1-U interface on the MobileNext Broadband Gateway. The S1-U interface is between the Serving Gateway (S-GW) and a mobile radio network, specifically, the enhanced Node B (eNodeB). The S1-U interface processes GPRS tunneling protocol, user (GTP-U) payloads inside UDP datagrams.

You can configure many of the same parameters for the GTP (**gtp**) hierarchy level and the S1-U (**s1u**) interface hierarchy level. When configured as separate GTP or interface parameters, the values at the S1-U (**s1u**) hierarchy level override the values configured at the GTP (**gtp**) hierarchy level.

You can configure the following parameters at the GTP and S1-U hierarchy levels:

- **echo-interval**
- **echo-n3-requests**
- **echo-t3-response**
- **interface**
- **path-management**

To configure GTP-U services on an S1-U interface for a broadband gateway configured as an S-GW named MBG2:

1. Configure an IPv4 or IPv6 address on a loopback interface to specify the transport addresses on which GTP-U packets on the S1-U interface are received.

   [edit unified-edge mobile gateways sgw *MBG2* gtp]
   [edit unified-edge mobile gateways sgw *MBG2* gtp s1u]
   user@host# **set interface** *lo0.2* **v4-address** *10.10.10.2*

2. (Optional) Enable path management.

   [edit unified-edge mobile gateways sgw *MBG2* gtp]
   [edit unified-edge mobile gateways sgw *MBG2* gtp s1u]
   user@host# **set path-management enable**

   NOTE: **Path management on the S1-U interface is disabled by default.**

3. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to an eNodeB.

   [edit unified-edge mobile gateways sgw *MBG2* gtp]
   [edit unified-edge mobile gateways sgw *MBG2* gtp s1u]
   user@host# **set echo-n3-requests** *6*

4. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

   [edit unified-edge mobile gateways sgw *MBG2* gtp]
   [edit unified-edge mobile gateways sgw *MBG2* gtp s1u]

```
user@host# set echo-t3-response 4
```

5. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received.

```
[edit unified-edge mobile gateways sgw MBG2 gtp]
[edit unified-edge mobile gateways sgw MBG2 gtp s1u]
user@host# set echo-interval 65
```

**Related Documentation**

- GPRS Tunneling Protocol (GTP) Overview on page 224
- Configuring General GTP Service on the S-GW on page 257
- Configuring GTP Services on the S4 Interface on page 265
- Configuring GTP-C Services on the S11 Interface on page 260
- Configuring GTP-U Services on the S12 Interface on page 262
- Example: Configuring GTP for the S-GW When Interfaces Are in different VRFs on page 273

## Configuring GTP Services on the S4 Interface

The following configuration specifies the parameters for a 3GPP S4 interface on the MobileNext Broadband Gateway. The S4 interface is between the Serving Gateway (S-GW) and a Serving GPSR Support Node (SGSN). The S4 interface processes GPRS tunneling protocol, control (GTP-C) version 2 and GTP, user (GTP-U) payloads inside UDP datagrams.

You can configure many of the same parameters for GTP-C (control) and GTP-U (data) payloads on the S4 interface. When configured as separate interface, control, or data parameters, these values override the values configured at the GTP (**gtp**) hierarchy level. Parameters at the control or data level override those set at the S4 (**s4**) hierarchy level.

You can configure the following parameters at multiple GTP hierarchy levels:

- **echo-interval**
- **echo-n3-requests**
- **echo-t3-response**
- **interface**
- **n3-requests** (all levels except S4 data)
- **path-management**
- **t3-response** (all levels except S4 data)

To configure GTP services on an S4 interface for a broadband gateway configured as an S-GW called MBG2:

1. Configure an interface to use for GTP packets. If the interface has more than one IP address, you can specific which address to use.

```
[edit unified-edge mobile gateways sgw MBG2 gtp]
[edit unified-edge mobile gateways sgw MBG2 gtp s4]
[edit unified-edge mobile gateways sgw MBG2 gtp s4 control]
[edit unified-edge mobile gateways sgw MBG2 gtp s4 data]
user@host# set interface lo0.2 v4-address 10.10.10.2
```

2. (Optional) Disable or enable path management.

```
[edit unified-edge mobile gateways sgw MBG2 gtp]
[edit unified-edge mobile gateways sgw MBG2 gtp s4]
[edit unified-edge mobile gateways sgw MBG2 gtp s4 control]
[edit unified-edge mobile gateways sgw MBG2 gtp s4 data]
user@host# set path-management disable
```

NOTE: Path management is enabled by default.

3. For tunnel management, configure the maximum number of times that the gateway will attempt to send signaling-request messages to an SGSN.

```
[edit unified-edge mobile gateways sgw MBG2 gtp]
[edit unified-edge mobile gateways sgw MBG2 gtp s4]
[edit unified-edge mobile gateways sgw MBG2 gtp s4 control]
user@host# set n3-requests 6
```

NOTE: This parameter cannot be set for S4 data (GTP-U).

4. For tunnel management, configure the time that the gateway waits before resending a signaling-request message when a response to the request has not been received.

```
[edit unified-edge mobile gateways sgw MBG2 gtp]
[edit unified-edge mobile gateways sgw MBG2 gtp s4]
[edit unified-edge mobile gateways sgw MBG2 gtp s4 control]
user@host# set t3-response 8
```

NOTE: This parameter cannot be set for S4 data (GTP-U).

5. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to an SGSN.

```
[edit unified-edge mobile gateways sgw MBG2 gtp]
[edit unified-edge mobile gateways sgw MBG2 gtp s4]
[edit unified-edge mobile gateways sgw MBG2 gtp s4 control]
[edit unified-edge mobile gateways sgw MBG2 gtp s4 data]
user@host# set echo-n3-requests 6
```

6. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

```
[edit unified-edge mobile gateways sgw MBG2 gtp]
[edit unified-edge mobile gateways sgw MBG2 gtp s4]
[edit unified-edge mobile gateways sgw MBG2 gtp s4 control]
[edit unified-edge mobile gateways sgw MBG2 gtp s4 data]
user@host# set echo-t3-response 4
```

7. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received from the peer.

   [edit unified-edge mobile gateways sgw MBG2 gtp]
   [edit unified-edge mobile gateways sgw MBG2 gtp s4]
   [edit unified-edge mobile gateways sgw MBG2 gtp s4 control]
   [edit unified-edge mobile gateways sgw MBG2 gtp s4 data]
   user@host# **set echo-interval *65***

8. To configure parameters for GTP control packets for the S4 interface:

   a. Specify a forwarding class for outbound control packets.

      [edit unified-edge mobile gateways sgw *MBG2* gtp s4 control]
      user@host# **set forwarding-class *assured-forwarding***

   b. Specify a DSCP value in the IP packet header for outbound control packets.

      [edit unified-edge mobile gateways sgw *MBG2* gtp s4 control]
      user@host# **set dscp-code-point *010110***

**Related Documentation**

- GPRS Tunneling Protocol (GTP) Overview on page 224
- Configuring General GTP Service on the S-GW on page 257
- Configuring GTP-C Services on the S11 Interface on page 260
- Configuring GTP-U Services on the S12 Interface on page 262
- Example: Configuring GTP for the S-GW When Interfaces Are in different VRFs on page 273

## Configuring GTP Services on the S-GW When the S4 and S5 Interfaces Are in the Same VRF

To configure GTP services on a MobileNext Broadband Gateway configured as a Service Gateway (S-GW) when the S4 (between Serving GPRS Support Node [SGSN] and S-GW) and S5 (between S-GW and Packet Data Network Gateway [P-GW]) interfaces are the same virtual routing and forwarding (VRF) routing instances, you specify a single loopback interface IP address for the S4 and S5 interfaces.

To configure GTP services for a MobileNext Broadband Gateway configured as a S-GW when the S4 and S5 interfaces are in the same VRF:

1. Configure the maximum number of peer entries for which the gateway stores statistics collected for deleted peers.

   [edit unified-edge mobile gateways sgw *SGW--vrf-green* gtp]
   user@host# **set peer-history 1000**

2. For tunnel management, configure the maximum number of times that the gateway will attempt to send signaling-request messages to a peer.

   [edit unified-edge mobile gateways sgw *SGW--vrf-green* gtp]
   user@host# **set n3-requests *6***

3. For tunnel management, configure the time that the gateway waits before resending a signaling-request message when a response to the request has not been received.

   [edit unified-edge mobile gateways sgw *SGW--vrf-green* gtp]
   user@host# **set t3-response** ***8***

4. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to a peer.

   [edit unified-edge mobile gateways sgw *SGW--vrf-green* gtp]
   user@host# **set echo-n3-requests** ***6***

5. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

   [edit unified-edge mobile gateways sgw *SGW--vrf-green* gtp]
   user@host# **set echo-t3-response** ***4***

6. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received from the peer.

   [edit unified-edge mobile gateways sgw *SGW--vrf-green* gtp]
   user@host# **set echo-interval** ***65***

7. Configure a loopback interface and IP address to specify the transport address on which all GTP packets transported on the S4 interface are received

   [edit unified-edge mobile gateways sgw *SGW--vrf-green* gtp s4]
   user@host# **set interface** ***lo0.1*** **v4-address** ***10.10.10.10***

   NOTE: This interface uses lo0.1.

8. Configure a loopback interface and IP address to specify the transport address on which all GTP packets transported on the S5 interface are received

   [edit unified-edge mobile gateways sgw *SGW--vrf-green* gtp s5]
   user@host# **set interface** ***lo0.1*** **v4-address** ***10.10.10.10***

   NOTE: This interface also uses lo0.1.

9. Configure security trace options for the gateway:

   a. Specify a name for the file that receives the output of the tracing operation.

      [edit unified-edge mobile gateways sgw *SGW-vrf-green* gtp traceoptions]
      user@host# **set file** ***gtp_log***

   b. Configure the maximum size for the trace file.

      [edit unified-edge mobile gateways spgw *SGW-vrf-green* gtp traceoptions]
      user@host# **set size** ***50m***

**Related Documentation**

- Configuring General GTP Service on the S-GW on page 257
- Configuring GTP Services on the S4 Interface on page 265

- Configuring GTP Services on the S5 Interface on page 241
- Configuring GTP Services on the S-GW When the S4 and S5 Interfaces Are in the Same VRF on page 267
- GPRS Tunneling Protocol (GTP) Overview on page 224

## Configuring GTP Services on the S-GW When Interfaces are in Different VRFs

To configure GTP services on a MobileNext Broadband Gateway configured as a S-GW when the S4 (between Serving GPRS Support Node [SGSN] and S-GW) and S5 (between S-GW and Packet Data Network Gateway [P-GW]) interfaces are in different virtual routing and forwarding (VRF) routing instances, you specify a different loopback interface but same IP address for each interface.

To configure GTP services for a broadband gateway configured as a S-GW when the S4 and S5 interfaces are in different VRFs:

1. Configure the maximum number of peer entries for which the gateway stores statistics collected for deleted peers.

   [edit unified-edge mobile gateways sgw *SGW-1* gtp]
   user@host# **set peer-history 1000**

2. For tunnel management, configure the maximum number of times that the gateway will attempt to send signaling-request messages to a peer.

   [edit unified-edge mobile gateways sgw *SGW-1* gtp]
   user@host# **set n3-requests *6***

3. For tunnel management, configure the time that the gateway waits before resending a signaling-request message when a response to the request has not been received.

   [edit unified-edge mobile gateways sgw *SGW-1* gtp]
   user@host# **set t3-response *8***

4. For path management, configure the maximum number of times that the gateway will attempt to send an echo-request message to a peer (SGSN or S-GW).

   [edit unified-edge mobile gateways sgw *SGW-1* gtp]
   user@host# **set echo-n3-requests *6***

5. For path management, configure the time that the gateway waits before resending an echo-request message when an echo response to the echo request is not received.

   [edit unified-edge mobile gateways sgw *SGW-1* gtp]
   user@host# **set echo-t3-response *4***

6. For path management, configure the number of seconds that the gateway waits before sending an echo-request message after an echo response is received from the peer.

   [edit unified-edge mobile gateways sgw *SGW-1* gtp]
   user@host# **set echo-interval *65***

7. Configure a loopback interface and IP address to specify the transport address on which all GTP packets transported on the S4 interface are received.

```
[edit unified-edge mobile gateways sgw SGW-1 gtp s4]
user@host# set interface lo0.1 v4-address 10.10.10.10
```

NOTE: This interface uses lo0.1.

8. Configure a loopback interface and IP address to specify the transport address on which all GTP packets transported on the S5 interface are received.

```
[edit unified-edge mobile gateways sgw SGW-1 gtp s5]
user@host# set interface lo0.2 v4-address 10.10.10.10
```

NOTE: This interface uses lo0.2.

9. Configure security trace options for the gateway:

   a. Specify a name for the file that receives the output of the tracing operation.

```
[edit unified-edge mobile gateways sgw SGW-1 gtp traceoptions]
user@host# set file gtp_log
```

   b. Configure the maximum size for the trace file.

```
[edit unified-edge mobile gateways sgw SGW-1 gtp traceoptions]
user@host# set size 50m
```

**Related Documentation**

- Configuring General GTP Service on the S-GW on page 257
- Configuring GTP Services on the S4 Interface on page 265
- Configuring GTP Services on the S5 Interface on page 241
- Configuring General GTP Service on the S-GW on page 257
- Configuring GTP Trace Options on page 255
- Configuring S-GW GTP Traceoptions on page 270
- GPRS Tunneling Protocol (GTP) Overview on page 224

## Configuring S-GW GTP Traceoptions

GPRS tunneling protocol (GTP) tracing operations record detailed messages about the operation of Serving Gateway (S-GW) GTP services on the MobileNext Broadband Gateway. You can trace various types of S-GW GTP operations such as errors, warnings, configuration events, and other information. You can specify which trace operations are logged by including specific tracing flags and levels.

Table 39 on page 271 describes the flags relating to the S-GW GTP that you can include at the **[edit unified-edge gateways sgw *gateway-name* gtp traceoptions flag]** hierarchy level.

### Table 39: S-GW GTP Trace Flags

| Flag | Description |
|---|---|
| **all** | Trace everything. |
| **config** | Trace configuration events. |
| **debug** | Trace debug information |
| **decode** | Trace decoding of received packets. |
| **encode** | Trace encoding of transmitted packets. |
| **error** | Trace internal or external errors. |
| **events** | Trace all internal or external events. |
| **packet-io** | Trace transmitted and received packets. |
| **peer** | Trace GTP peer-related events. |
| **trackers** | Trace GTP tracker-related events. |
| **warning** | Trace warnings. |

Table 40 on page 271 describes the levels you can include.

### Table 40: S-GW GTP Trace Levels

| Level | Description |
|---|---|
| **all** | Match all levels. |
| **error** | Match error conditions. |
| **info** | Match informational messages. |
| **notice** | Match conditions that should be specially handled. |
| **verbose** | Match verbose messages. |
| **warning** | Match warning messages. |

To configure tracing options for GTP operations:

1. Specify that you want to configure tracing options for GTP operations.

   [edit unified-edge gateways sgw *MBG2* gtp]
   user@host# **edit traceoptions**

NOTE: You can use the no-remote-trace statement at this level to disable remote tracing capabilities.

2. Configure the filename for the trace file.

   [edit unified-edge gateways sgw *MBG2* gtp traceoptions]
   user@host# **set file *datapath-log***

3. (Optional) Configure the maximum size of each trace file.

   [edit unified-edge gateways sgw *MBG2* gtp traceoptions]
   user@host# **set file size 100m**

NOTE: When a trace file (for example, sgw-gtp-log) reaches its maximum size, it is renamed sgw-gtp-log.0, then sgw-gtp-log.1, and so on, until the maximum number of trace files is reached. The oldest archived file is then overwritten.

4. Configure the tracing flag.

   [edit unified-edge gateways sgw *MBG2* gtp traceoptions]
   user@host# **set flag all**

NOTE: You should use care when tracing all operations on a gateway. This can have a performance impact.

5. Configure the tracing level.

   [edit unified-edge gateways sgw *MBG2* gtp traceoptions]
   user@host# **set level error**

6. View the trace file.

   user@host# **file show /var/log/sgw-gtp-log**

**Related Documentation**

- Configuring General GTP Service on the S-GW on page 257
- Configuring GTP Trace Options on page 255
- GPRS Tunneling Protocol (GTP) Overview on page 224
- Configuring S-GW Traceoptions on page 32
- Configuring S-GW Data Path Traceoptions on page 97
- Configuring S-GW Charging Traceoptions on page 292
- Configuring S-GW Local Persistent Storage Traceoptions on page 295

## Example: Configuring GTP for the S-GW When Interfaces Are in different VRFs

This example describes how to configure the MobileNext Broadband Gateway Serving Gateway (S-GW) GTP interfaces when the interfaces are in different virtual routing and forwarding (VRF) routing instances. The emphasis is on GTP configuration, and does not include many other parameters a full S-GW configuration requires.



### Requirements

This example uses the following hardware and software components:

- Junos OS Release 11.4W
- Juniper Networks MobileNext Broadband Gateway

### Overview

This example describes how to configure the broadband gateway GTP interfaces when the interfaces are in different VRF routing instances. The VRFs are used to support the following configuration:

- The S11 and S5 control interfaces are in the same VRF.
- The S1-U, S12, S4, and S5 data interfaces are in the same VRF, but this VRF is not the same as the control interfaces.

**Table 41: Components of the Broadband Gateway**

| Property | Settings | Description |
|---|---|---|
| Loopback addresses | lo0 unit 111 address 192.168.111.1/32<br>lo0 unit 112 address 192.168.112.1/32 | Identifies the device for communications. |
| Interface family | family inet | The logical units belong to family inet. |
| S11/S5 control connectivity | VRF11-Control<br>lo0.111 | VRF for S11/S5 interfaces for control |
| S1-U/S12/S4/S5 data connectivity | VRF12-Data<br>lo0.122 | VRF for S1-U/S12/S4 interfaces for data |

## Configuration



### Configuring the Interfaces

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set chassis redundancy graceful-switchover
set system commit synchronize
load merge /etc/config/mobility-defaults.conf
set chassis fpc 1 pic 0 apply-groups mobility
set chassis fpc 1 pic 1 apply-groups mobility
set chassis fpc 3 pic 0 apply-groups mobility
set chassis fpc 3 pic 1 apply-groups mobility
set chassis fpc 0 forwarding-packages mobility sgw
set chassis fpc 5 forwarding-packages mobilitysgw
set interfaces lo0 unit 111 family inet address 192.168.111.1/32
set interfaces lo0 unit 112 family inet address 192.168.112.1/32
```

**Step-by-Step Procedure**

To configure the chassis:

1. Enable graceful restart for Routing Engine redundancy.

   ```
   [edit]
   user@pe1# set chassis redundancy graceful-switchover
   ```

2. Load and merge the default configuration file for the **mobility** group.

   ```
   [edit]
   user@pe1# load merge /etc/config/mobility-defaults.conf
   ```

3. Configure the **mobility** group on the session DPCs.

   ```
   [edit]
   user@pe1# set chassis fpc 1 pic 0 apply-groups mobility
   user@pe1# set chassis fpc 1 pic 1 apply-groups mobility
   user@pe1# set chassis fpc 3 pic 0 apply-groups mobility
   user@pe1# set chassis fpc 3 pic 1 apply-groups mobility
   ```

   NOTE: You must include every services PIC configured with the **jservices-mobile** package at the **[edit unified-edge gateways sgw *gateway-name* system anchor-spics]** hierarchy level on the broadband gateway. If you do not include the services PIC as an anchor interface, then the services PIC will not be used by the broadband gateway.

4. Configure the interface DPC or MPC at the FPC level.

   ```
   [edit]
   ```

```
user@pe1# set chassis fpc 0 forwarding-packages mobility sgw
user@pe1# set chassis fpc 5 forwarding-packages mobility sgw
```

NOTE: You must include every Packet Forwarding Engine configured with the sgw forwarding package at the **[edit unified-edge gateways sgw *gateway-name* system anchor-pfes]** hierarchy level on the broadband gateway. If you do not specify the Packet Forwarding Engine as an anchor interface, then the Packet Forwarding Engine will not be used by the broadband gateway.

5. Configure loopback interfaces.

```
[edit]
user@pe1# set interfaces lo0 unit 111 family inet address 192.168.111.1/32
user@pe1# set interfaces lo0 unit 112 family inet address 192.168.112.1/32
```

## Enabling the Routing Instances for the VRF

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set routing-instances VRF11-Control instance-type vrf
set routing-instances VRF11-Control interface lo0.111
set routing-instances VRF11-Control route-distinguisher 192.168.111.1:111
set routing-instances VRF11-Control vrf-target target:1:111
set routing-instances VRF11-Control vrf-table-label
set routing-instances VRF12-Data instance-type vrf
set routing-instances VRF12-Data interface lo0.112
set routing-instances VRF12-Data route-distinguisher 192.168.112.1:112
set routing-instances VRF12-Data vrf-target target:1:112
set routing-instances VRF12-Data vrf-table-label
```

**Step-by-Step Procedure**

To configure the routing instance for the VRF used:

BEST PRACTICE: For GTP traffic, use the vrf-table-label option when configuring the routing instances.

1. Configure the VRF routing instances for GTP traffic.

```
[edit]
user@pe1# set routing-instances VRF11-Control instance-type vrf
user@pe1# set routing-instances VRF11-Control interface lo0.111
user@pe1# set routing-instances VRF11-Control route-distinguisher 192.168.111.1:111
user@pe1# set routing-instances VRF11-Control vrf-target target:1:111
user@pe1# set routing-instances VRF11-Control vrf-table-label
user@pe1# set routing-instances VRF12-Data instance-type vrf
user@pe1# set routing-instances VRF12-Data interface lo0.112
user@pe1# set routing-instances VRF12-Data route-distinguisher 192.168.112.1:112
```

```
user@pe1# set routing-instances VRF12-Data vrf-target target:1:112
user@pe1# set routing-instances VRF12-Data vrf-table-label
```

## Configuring GTP Interfaces

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways sgw MBG1 gtp s11 interface lo0.111
set unified-edge gateways sgw MBG1 gtp s5 control interface lo0.111
set unified-edge gateways sgw MBG1 gtp s1u interface lo0.112
set unified-edge gateways sgw MBG1 gtp s12 interface lo0.112
set unified-edge gateways sgw MBG1 gtp s4 data interface lo0.112
set unified-edge gateways sgw MBG1 gtp s5 data interface lo0.112
```

**Step-by-Step Procedure**

To configure GTP interfaces:

1. Configure the GTP interfaces for the broadband gateway called MBG1.

   ```
   [edit]
   user@pe1# edit unified-edge gateways sgw MBG1 gtp
   ```

2. Specify the appropriate loopback interface associated with the VRF routing instance for the S11 and S5 control interfaces and S1-U, S12, S4, and S5 data interfaces.

   ```
   [edit unified-edge gateways sgw MBG1 gtp]
   user@pe1# set s5 control interface lo0.111
   user@pe1# set s11 interface lo0.111
   user@pe1# set s1u interface lo0.112
   user@pe1# set s12 interface lo0.112
   user@pe1# set s4 data interface lo0.112
   user@pe1# set s5 data interface lo0.112
   ```

**Related Documentation**

- Configuring General GTP Service on the S-GW on page 257
- Configuring GTP Trace Options on page 255
- GPRS Tunneling Protocol (GTP) Overview on page 224

PART 6

# Charging Configuration

CHAPTER 10

# Charging Overview



## Charging

In the mobile network, it is important to have detailed and accurate monitoring of service usage on the MobileNext Broadband Gateway so that proper charging information can be generated for millions of customers. In the Third-Generation Partnership Project (3GPP), there are three distinct aspects to the process that translates service use into a bill for services. These aspects are charging, rating, and billing. Charging gathers statistics about service usage for each customer. Rating is the process of determining how much each service costs each particular customer, based on the services contracted or tariffed. Billing is the process of actually generating the customer's invoice for services.

The broadband gateway is the anchor of the data call and contains most of the subscriber context information. The broadband gateway is responsible for collecting charging information related to the external data network usage and to network resource usage on the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW), including the amount of data categorized by quality of service (QoS), the user protocols, and the usage of the packet data protocol address. Packet data volume in both the uplink (from the Gn-to-Gi interface) and downlink (from the Gi-to-Gn interface) directions is counted separately.

The broadband gateway provides support for billing through offline charging, RADIUS accounting, or both. RADIUS accounting delivers accounting information used for billing to the RADIUS accounting server.

**Related Documentation**

- Charging Services Overview on page 279

## Charging Services Overview

The MobileNext Broadband Gateway supports offline charging, which is commonly used in a postpaid environment. The broadband gateway provides mobile operators with an intelligent charging service that has flexible provisioning and accurate resource usage

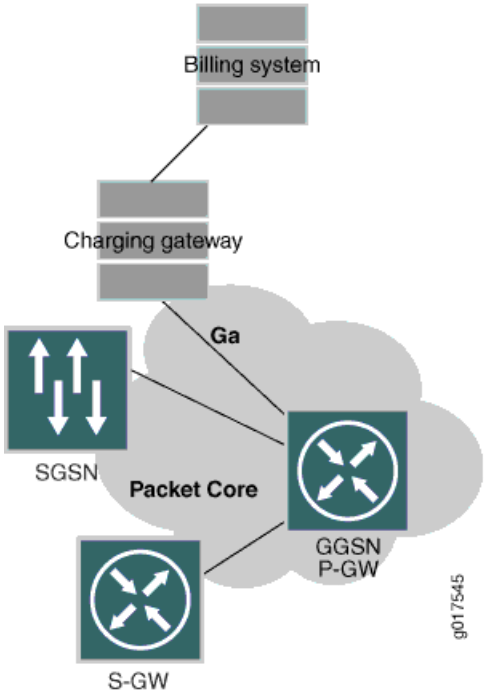
record collection for their mobile subscribers. The broadband gateway gathers Charging Data Records (CDRs) and delivers them to the charging gateway function (CGF) over the Ga interface using the GTP Prime protocol. The billing function is distributed across all modules of the broadband gateway, which performs these tasks for billing:

- Accurate CDR creation and closure
- Partial record generation
- ASN.1 formatting of CDRs prior to transfer to CGF or local storage
- Support of GTP Prime protocol stack to transfer CDRs to the CGF
- Support of primary, secondary, and tertiary CGF for redundancy of each charging profile

Charging information collection does not affect real-time operations and is transferred over the Ga interface using the GTP Prime protocol. The network element generates the CDR for each subscriber and reports it periodically to the charging gateway. The charging gateway then optionally reformats and transfers the collected CDRs to the operator's billing system for billing purposes.

Figure 46 on page 280 shows the components in a sample charging topology.

### Figure 46: Simple Charging Topology




The provisioning of the charging services follows this process:

1. Configure the CGF or local storage.
2. Create the transport profile and associate the primary, secondary, and tertiary CGF.
3. (Optional) Configure the CDR and trigger profiles.

4. Create a charging profile with a profile ID and the associated transport, CDR, and trigger profiles. The profile ID is used to match against the charging characteristic information element sent in the GTP create request or the RADIUS profile id AVP from the RADIUS authentication response.
5. In the access point name (APN) configuration, configure the charging profile selection order as static to select locally configured charging profiles.

The binding of the charging services, as well as the charging information collection, follows this process:

1. The broadband gateway starts to establish a bearer when the broadband gateway receives the request from the mobile subscriber to create a packet data protocol (PDP) context.
2. For each new bearer created in the broadband gateway, the configured charging profile selection order algorithm is applied and a charging profile is associated with the bearer.
3. The broadband gateway generates a container or CDR for every trigger or signaling event that the operator wants reported for this subscriber.
4. When the mobile subscriber terminates the session, the final network usage is reported to the CGF by the broadband gateway.

**Related Documentation**

- Configuring GTP Prime for Charging on page 297
- Configuring Persistent Storage on page 299
- Charging Data Records on page 281
- Charging Profiles on page 285

## Charging Data Records

The MobileNext Broadband Gateway gathers charging information in Charging Data Records (CDRs). The broadband gateway supports different charging format versions.

The broadband gateway generates CDRs that contain the following types of information to charge a mobile station user or subscriber for accessing data from access point name (APN) networks:

- Data volume—Amount of data sent to and received from the APN networks.
- Duration of packet data protocol (PDP) context—Length of PDP context or call.
- Quality-of-service (QoS) classes—Priority at which requested data is transported.
- Roaming—Charges imposed for subscriber roaming among SGSNs belonging to a mobile operator or between different mobile operators.
- Tariff—Charges imposed based on the time of day.

CDRs can be delivered by the following methods:

- CDRs are transferred directly to a charging gateway server using the GTP Prime protocol.

  The GTP Prime protocol supports UDP or TCP as the transport protocol, and IPv4 addresses. You must configure the charging gateways as GTP Prime peers. The peers can be configured for use by transport profiles as primary, secondary, or tertiary servers.

  The broadband gateway supports sending the following messages:

  - Node Alive Response—Response to Node Alive Request received from the charging gateway function (CGF). The Node Alive Request message is used to indicate that a node in the network has started its service.
  - Echo Request and Echo Response—The Echo Request message detects the path status between the CGF and the broadband gateway and should not be sent more than once every 60 seconds using UDP as the transport protocol.
  - Redirect Request—CGF can send Redirect Request messages to the broadband gateway to advise that received CDR traffic is to be redirected to another CGF or that the next node in the chain (such as a mediation device or billing computer) has lost its connection to the CGF. When the request is to redirect to another CGF, the transport profile switches to the recommended CGF only if it is configured as a peer in the transport profile; otherwise, it switches to the next highest-priority peer in the transport profile.

- CDRs are logged to the local persistent storage and eventually retrieved by a charging gateway using the File Transfer Protocol (FTP). In broadband gateways configured with a backup Routing Engine, a mirror directory of CDRs is available.

  Local persistent storage stores the CDRs in the form of files on the Routing Engine. When the transport profile is configured to use local persistent storage for CDRs, the session DPC sends the CDRs to the Routing Engine as temporary log files. When the triggers (such as file age, file size, or CDR count) acting on the temporary log files are reached, the temporary log file is closed and moved to the final log directory where it is available for transfer by the operator. By default, the configured user or root user is authorized to access the files. However, you can configure the log files to be readable by all users.

  The final CDR log files are stored in the **/opt/mobility/charging/ggsn/final_log** directory in the filename format ***NodeID_-_RC.date_-_time*[*.PI*].cdr**, where:

  - *NodeID*—Name of the host that generated the file.
  - *RC*—Running count or sequence number, starting with the value of 1.
  - *date*—Date when the CDR file was closed in the format *YYYYMMDD*, where *YYYY* is the year, *MM* is the month (01-12), and *DD* is the day (01-31).
  - *time*—Time when the CDR file was closed in the format *HHMMshhmm*, where *HH* is the local time hour of day (00-23), *MM* is the local time minute of the hour (00-59), *s* is the sign of local time differential from UTC (+ or -), *hh* is the local time differential hour (00-23), and *mm* is the local time differential minute (00-59).

- *PI*—(Optional) Private information that is explicitly configured.
- cdr—File extension is always cdr.

The charging gateway consolidates charges for a particular PDP context from the broadband gateway. Each CDR is marked with a charging ID that identifies the mobile station user and the particular PDP session. This charging ID correlates information generated by the broadband gateway. Each CDR also includes a Local Record Sequence Number (LRSN) that is allocated sequentially and is unique for each CDR on the same session DPC. The LRSN is the IP address of the broadband gateway and the node ID. The charging gateway uses the LRSN to identify missing records. The billing gateway uses the charging ID and the LRSN to identify CDRs. The billing gateway server generates the information used in the bill that is sent to the subscriber.

## Information Collection and CDR Generation

Upon establishment of a PDP context, the broadband gateway opens a first partial CDR if it is configured to generate CDRs for the PDP context. The broadband gateway generates this CDR in Abstract Syntax Notation 1 (ASN.1) format. This format provides a common syntax for data transmitted between different communication systems.

This partial CDR contains static and dynamic information. The static information includes details such as the type of record (in this case, a CDR) and the international mobile station identifier (IMSI) of the subscriber. Additional information included in the CDR is based on the dynamic usage of an APN network by the subscriber. To collect dynamic usage information, the broadband gateway monitors the uplink and downlink bearer traffic associated with a PDP context.

A container holds the incremental statistics for the bearer. Each CDR has the containers that belong to the same bearer. Depending on the event, a container can be added to the CDR. You can configure the maximum number of containers for the CDR. Upon reaching this limit, the CDR is closed and sent to the CGF. The broadband gateway adds a container to the partial CDR each time one of the following chargeable events occurs:

- The QoS changes.
- The tariff changes.
- Other charging conditions are satisfied.

For example, if the QoS changes, a container is added. If the tariff changes, another container is added. If the QoS changes again, another container is added and so on until the maximum number of containers is reached.

The broadband gateway adds a container to the partial CDR and closes the CDR when one of the following chargeable events occurs:

- The PDP context terminates.
- The time limits are exceeded.
- The volume limits are exceeded.

The broadband gateway closes a partial CDR and opens a subsequent partial CDR if one of the following occurs:

- The configured number of containers for the container limit attribute is reached.
- A configurable data volume limit for the first partial CDR is reached. Each container has a data volume count associated with the chargeable event. Initially, the first partial CDR contains one container with 0 bytes of data volume.
- A configurable time limit for the first partial CDR is reached.
- The maximum of five SGSN or S-GW changes is reached. A container can include a list of up to five changes.

A very active broadband gateway has to generate a large number of CDRs. Many CDRs contain a lot of information that is not necessary for a given PDP context or is known to the charging gateway by other means. To minimize the size of the generated CDR packets, the charging configuration contains a variety of CDR attributes that can be excluded from CDRs if the information is not necessary.

After a PDP context terminates, a broadband gateway adds a container to the current partial CDR, closes it, and delivers it to a charging gateway using the configured CDR delivery method.

## CDR Delivery

CDR delivery to a charging gateway is based on the transport profile configuration. You can configure primary, secondary, and tertiary external charging gateways or local persistent storage in the transport profile. You must configure either the external charging gateways or local persistent storage, or both.

To support high throughput, the distributed control plane modules on the broadband gateway independently send CDRs to the charging gateway through their own UDP/TCP communication path. However, connectivity to the charging gateway is fate-shared. Thus, when one control plane reports loss of connectivity, all control planes switch to the next charging gateway in the peer order. This behavior also applies to GTP Prime echo failure, node alive, and redirect messages. The redirect message can contain the recommended charging gateway to switch to, but the transport profile switches to this charging gateway only if it is configured in the transport profile. Otherwise, it is redirected to the next higher-priority charging gateway in the peer order.

If the broadband gateway loses connectivity to all the charging gateways or the charging gateway is too slow, each control plane has a staging area to temporarily prevent the loss of CDRs. To prevent CDR and charging container record loss, all records are backed up to the backup control plane if redundancy is configured.

**Related Documentation**

- Configuring Charging on page 287
- Configuring Transport Profiles on page 303

## Charging Profiles

The broadband gateway associates a charging profile with a mobile subscriber when a bearer is established. The charging profile specifies the charging behavior to apply based on the subscriber's charging characteristics. The charging behavior includes the charging mechanism, charging information sets, and charging transport behavior. The charging behavior depends on the charging type (for example, charging gateway or RADIUS server) and the associated charging profile.

Charging profiles can reference these profiles, which define the charging behavior:

- CDR profile—Defines the attributes in each CDR transmitted to the charging gateway.

  You can enable the generation of reduced partial CDRs and configure the exclusion of information elements from the CDR.

- Transport profile—Defines how to transfer the CDR to the charging gateway.

  You can specify information about the CDRs, including CDR format and aggregation limit, being transferred to the charging gateways. You can specify the order of the charging gateways.

- Trigger profile—Defines the effective charging events that trigger CDR creation and container addition or closure.

  You can specify triggers, including:

  - Time limits—Maximum age of collected charging data before a subsequent CDR is generated.
  - Volume limits—Maximum amount of collected charging data before a subsequent CDR is generated.
  - Tariff activation times—Time windows in which tariffs change for charging purposes. If the services provided by an APN network have different time windows and tariffs, you can configure the broadband gateway to update CDRs when the tariffs change.
  - Container limits—Maximum number of containers in each CDR before a subsequent CDR is generated.
  - Bearer changes—Bearer information changes to ignore for charging data updates. Charging updates are not triggered by changes to this information.

### Charging Profile Selection Process

The MobileNext Broadband Gateway has a highly flexible charging profile selection algorithm that enables the operator to choose the appropriate charging configuration for each subscriber. Provisioning is done for each APN, where the operator can specify the profile selection order for the charging profile.

You can specify that the charging profile be selected from the following sources in the preferred order:

- Subscriber type (static)—Use the configured charging profile for the type of subscriber (home, roamer, or visitor). If the charging profile for the type of subscriber is not configured for the APN, then the default profile is used if configured.
- SGSN or Serving Gateway (serving)—Use the charging profile sent by the SGSN or Serving Gateway.
- RADIUS server (radius)—Use the charging profile provided by the RADIUS server.

If the charging profile cannot be selected from the first source in the profile selection order, then the algorithm will try the next source. If no charging profile can be selected from any source, then charging is disabled for the subscriber.

**Related Documentation**

- Configuring Charging Profiles on page 308
- Configuring Transport Profiles on page 303
- Configuring Charging Trigger Events on page 304
- Configuring CDR Attributes on page 306
- Configuring Charging Profiles for APNs on page 309

CHAPTER 11

# Configuring Charging



## Configuring Charging

You can configure the charging function on the MobileNext Broadband Gateway. The broadband gateway supports the configuration of offline charging. Offline charging can be configured to send Charging Data Records (CDRs) to charging gateways.

To configure the broadband gateway for offline charging:

- Configure the GPRS tunneling protocol (GTP) Prime properties for transmitting the CDR to the external charging gateway.

  You must perform this task if you are using an external charging gateway. You can also configure the local persistent storage options to store CDRs on the Routing Engine.

- Configure the local persistent storage options on the Routing Engine for the CDRs.

  You must perform this task if you do not configure the GTP Prime properties for the external charging gateway.

- Configure the transport profile, which specifies information about the CDRs being transferred to the specified charging gateways, including the CDR format and aggregation limit.
- (Optional) Configure the trigger profile, which specifies the charging events that trigger the creation of the CDR or the addition or closure of the container.
- (Optional) Configure the CDR profile, which specifies the attributes in each transmitted CDR.
- Configure the charging profile, which specifies the charging behavior to apply based on profiles included in the charging profile. The included profiles must be defined.
- Configure the charging profiles for the access point names (APNs).
- Configure tracing for charging operations.

**Related Documentation**

- Configuring GTP Prime for Transferring CDRs on page 297
- Configuring Persistent Storage on page 299
- Configuring Transport Profiles on page 303
- Configuring Charging Trigger Events on page 304
- Configuring CDR Attributes on page 306
- Configuring Charging Profiles on page 308
- Configuring Charging Profiles for APNs on page 309
- Tracing Charging Operations on page 310
- Charging Data Records on page 281

## Configuring S-GW-Specific Charging Parameters

The MobileNext Broadband Gateway Serving Gateway (S-GW) uses three charging statements unique to the S-GW. This topic shows how to configure the charging statements that are unique to the S-GW.

Before you begin configuring a S-GW charging parameters on the broadband gateway, you should have done the following:

- Configured the chassis of the MobileNext Broadband Gateway
- Configured the interfaces used by the MobileNext Broadband Gateway

To establish the charging parameters unique to the S-GW, you can exclude certain trigger events and exclude specific charging detail record (CDR) information. The use of all three statements is optional.

To configure the S-GW charging parameters trigger profile exclusion:

1. (Option) Configure the S-GW charging trigger profile change exclusion.

```
[edit unified-edge gateways sgw MBG-SGW1 charging trigger-profiles TP1 offline
  exclude]
user@host# set sgsn-mme-change
```

NOTE: When this statement is configured, a change in serving GPRS support node (SGSN) or S-GW does not generate a charging data update.

2. (Option) Exclude the P-GW address used in the CDR information element.

```
[edit unified-edge gateways sgw MBG-SGW1 charging cdr-profiles CDR1
  exclude-ie-options]
user@host# set pgw-address-used
```

NOTE: When this statement is configured, the P-GW IP address is not included in the CDR.

3. (Option) Exclude the S-GW change from the CDR information element.

```
[edit unified-edge gateways sgw MBG-SGW1 charging cdr-profiles CDR1
  exclude-ie-options]
user@host# set sgw-change
```

NOTE: When this statement is configured, the S-GW change information element is not included in the CDR.

4. Configure the CDR release.

```
[edit unified-edge gateways sgw MBG-SGW1 charging transport-profiles
  MBG-SGW1-T-Profile offline charging-gateways]
user@host# set cdr-release r8
```

NOTE: By default, the S-GW support Release 8. You must include this statement to change the supported release.

**Related Documentation**


- Configuring Charging on page 287
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- Configuring S-GW Charging Traceoptions on page 292
- Configuring S-GW Local Persistent Storage Traceoptions on page 295
- Configuring GTP Prime for Transferring CDRs on page 297
- Configuring Persistent Storage on page 299
- Configuring Transport Profiles on page 303
- Configuring Charging Trigger Events on page 304
- Configuring CDR Attributes on page 306

- Configuring Charging Profiles on page 308
- Configuring Charging Profiles for APNs on page 309
- Tracing Charging Operations on page 310
- Charging Data Records on page 281


## Configuring S-GW Global Charging Profiles and Selection Order

The MobileNext Broadband Gateway Serving Gateway (S-GW) uses five global profiles for charging. This topic described the profiles and shows how to configure the profile statements unique to the S-GW.

Before you begin configuring a S-GW CAC parameters on the broadband gateway, you should have done the following:

- Configured the chassis of the MobileNext Broadband Gateway
- Configured the interfaces used by the MobileNext Broadband Gateway
- Configured the charging profiles used by the MobileNext broadband Gateway

Global charging profile configuration is mandatory configuration to enable charging on the S-GW. Configuring the **profile-selection-order** statement is mandatory when the **global-profile** statement is configured. The S-GW determines the type of subscriber by comparing the mobile country code (MCC) and the mobile network code (MNC) values in the Create Session Request message from the subscriber's user equipment (UE) with the corresponding values configured for the home public land mobile network (HPLMN) for the S-GW. Depending on whether a subscriber is a home subscriber, a visitor, or a roamer, the **home-profile**, **visitor-profile**, or **roamer-profile** is applied. If the applicable profile is not configured, then the **default-profile**, if configured, is applied. If the **default-profile** is not configured, then no charging is applied to the subscriber session.

NOTE: The profiles must already be configured on the broadband gateway before you reference them in the profile statements.

The default profile is applied if other profiles are absent. If the **profile-selection-order** configuration is **static**, and if the corresponding charging profile applicable to the type of subscriber (home, visitor, or roamer) has not been specified, then the default profile is applied.

The home profile is applied to home users based on PLMN configuration. If the **profile-selection-order** configuration is **static**, and this is a home user, then the home profile is applied.

The roamer profile is applied to roaming users based on PLMN configuration. If the **profile-selection-order** configuration is **static**, and this is a roaming user, then the roaming profile is applied.

The visitor profile is applied to visitiing users based on PLMN configuration. If the **profile-selection-order** configuration is **static**, and this is a visiting user, then the visiting profile is applied.

The profile selection order determines the order that the methods used to select a charging profile are applied. You can specify up to three profile selection methods: **static**, **serving**, or **pgw-cg-addr**. If the first choice is not available, then the next choice is considered, and so on.

NOTE: If no charging profile can be selected for the user, then the subscriber is not charged for the session.

Consider a configured profile selection order of **static**, **serving**, and **pgw-cg-addr**. Because **static** is the first choice, the global charging profiles specified are used. If the global charging profiles are not configured, then the next choice (**serving**) is considered. If the serving GPRS support node (SGSN) or S-GW does not provide a charging profile identifier in the charging characteristics information element (IE) within the GPRS tunneling protocol (GTP) Create Session message, then the next choice (**pgw-cg-addr**) is considered. With the **pgw-cg-addr** option, the global charging profile is selected based on the IP address of the charging gateway (CG) for the P-GW.

To configure the S-GW global charging profiles and selection order:

1. Configure the S-GW default global charging profile.

   ```
   [edit unified-edge gateways sgw MBG-SGW1 charging global-profile]
   user@host# set default-profile MBG-SGW1-default
   ```

2. Configure the S-GW home user global charging profile.

   ```
   [edit unified-edge gateways sgw MBG-SGW1 charging global-profile]
   user@host# set home-profile MBG-SGW1-home
   ```

3. Configure the S-GW roaming user global charging profile.

   ```
   [edit unified-edge gateways sgw MBG-SGW1 charging global-profile]
   user@host# set roamer-profile MBG-SGW1-roaming
   ```

4. Configure the S-GW visiting user global charging profile.

   ```
   [edit unified-edge gateways sgw MBG-SGW1 charging global-profile]
   user@host# set vistor-profile MBG-SGW1-visiting
   ```

5. Configure the S-GW global charging profile selection order.

   ```
   [edit unified-edge gateways sgw MBG-SGW1 charging global-profile]
   user@host# set profile-selection-order static serving pgw-cg-addr
   ```

**Related Documentation**

- Configuring Charging on page 287
- Configuring S-GW-Specific Charging Parameters on page 288
- Configuring S-GW Charging Traceoptions on page 292
- Configuring S-GW Local Persistent Storage Traceoptions on page 295

## Configuring S-GW Charging Traceoptions

Charging tracing operations record detailed messages about the operation of Serving Gateway (S-GW) charging services on the MobileNext Broadband Gateway. You can trace various types of S-GW charging operations such as triggers, resources, configuration events, and other information. You can specify which trace operations are logged by including specific tracing flags and levels.

Table 42 on page 292 describes the flags relating to the S-GW that you can include at the **[edit unified-edge gateways sgw *gateway-name* charging traceoptions flag]** hierarchy level.

### Table 42: S-GW Charging Trace Flags

| Flag | Description |
|---|---|
| **all** | Trace everything. |
| **cdr-encoding** | Trace Charging Detail Record (CDR) encoding. |
| **client-fsm** | Trace client finite state machine (FSM). |
| **config** | Trace configuration events. |
| **fsm** | Trace FSM events. |
| **general** | Trace general events. |
| **group-fsm** | Trace group FSM events. |
| **init** | Trace initialization events. |
| **ipc** | Trace IPC events. |
| **path-management** | Trace path management module. |
| **request** | Trace requests. |

Table 42: S-GW Charging Trace Flags *(continued)*

| | |
|---|---|
| **resource** | Trace resources. |
| **response** | Trace response. |
| **timers** | Trace timers. |
| **transport** | Trace transport group. |
| **triggers** | Trace trigger information. |

Table 43 on page 293 describes the levels you can include.

Table 43: S-GW Charging Trace Levels

| Level | Description |
|---|---|
| **all** | Match all levels. |
| **error** | Match error conditions. |
| **info** | Match informational messages. |
| **notice** | Match conditions that should be specially handled. |
| **verbose** | Match verbose messages. |
| **warning** | Match warning messages. |

To configure tracing options for charging operations:

1. Specify that you want to configure tracing options for charging operations.

   [edit unified-edge gateways sgw *MBG2* charging]
   user@host# **edit traceoptions**

   NOTE: You can use the **no-remote-trace** statement at this level to disable remote tracing capabilities.

2. Configure the filename for the trace file.

   [edit unified-edge gateways sgw *MBG2* charging traceoptions]
   user@host# **set file *datapath-log***

3. (Optional) Configure the maximum size of each trace file.

   [edit unified-edge gateways sgw *MBG2* charging traceoptions]
   user@host# **set file size 100m**

NOTE: When a trace file (for example, sgw-charging-log) reaches its maximum size, it is renamed sgw-charging-log.0, then sgw-charging-log.1, and so on, until the maximum number of trace files is reached. The oldest archived file is then overwritten.

4. Configure the tracing flag.

   [edit unified-edge gateways sgw *MBG2* charging traceoptions]
   **user@host# set flag all**

   NOTE: You should use care when tracing all operations on a gateway. This can have a performance impact.

5. Configure the tracing level.

   [edit unified-edge gateways sgw *MBG2* charging traceoptions]
   **user@host# set level error**

6. View the trace file.

   **user@host# file show /var/log/sgw-charging-log**

**Related Documentation**

- Configuring Charging on page 287
- Configuring S-GW-Specific Charging Parameters on page 288
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- Configuring S-GW Local Persistent Storage Traceoptions on page 295
- Configuring GTP Prime for Transferring CDRs on page 297
- Configuring Persistent Storage on page 299
- Configuring Transport Profiles on page 303
- Configuring Charging Trigger Events on page 304
- Configuring CDR Attributes on page 306
- Configuring Charging Profiles on page 308
- Configuring Charging Profiles for APNs on page 309
- Tracing Charging Operations on page 310
- Charging Data Records on page 281
- Configuring S-GW Traceoptions on page 32
- Configuring S-GW Data Path Traceoptions on page 97
- Configuring S-GW GTP Traceoptions on page 270
- Configuring S-GW Local Persistent Storage Traceoptions on page 295

## Configuring S-GW Local Persistent Storage Traceoptions

Local persistent storage tracing operations record detailed messages about the operation of Serving Gateway (S-GW) charging information storage services on the MobileNext Broadband Gateway. You can trace various types of S-GW local persistent storage operations such as file operations, journaling, mirroring, and other information. You can specify which trace operations are logged by including specific tracing flags and levels.

Table 44 on page 295 describes the flags relating to the S-GW that you can include at the **[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage traceoptions flag]** hierarchy level.

### Table 44: S-GW Local Persistent Storage Trace Flags

| Flag | Description |
|---|---|
| **all** | Trace everything. |
| **connection** | Trace connection establishment with peers. |
| **file-operations** | Trace file open, write, and close operations. |
| **general** | Trace miscellaneous operations. |
| **journaling** | Trace file journaling operations. |
| **mirror** | Trace mirroring operations. |

Table 45 on page 295 describes the levels you can include.

### Table 45: S-GW Local Persistent Storage Trace Levels

| Level | Description |
|---|---|
| **all** | Match all levels. |
| **error** | Match error conditions. |
| **info** | Match informational messages. |
| **notice** | Match conditions that should be specially handled. |
| **verbose** | Match verbose messages. |
| **warning** | Match warning messages. |

To configure tracing options for local persistent storage operations:

1. Specify that you want to configure tracing options for local persistent storage operations.

   [edit unified-edge gateways sgw *MBG2* charging local-persistent-storage]

```
user@host# edit traceoptions
```

NOTE: You can use the no-remote-trace statement at this level to disable remote tracing capabilities.

2. Configure the filename for the trace file.

```
[edit unified-edge gateways sgw MBG2 charging local-persistent-storage traceoptions]
user@host# set file datapath-log
```

3. (Optional) Configure the maximum size of each trace file.

```
[edit unified-edge gateways sgw MBG2 charging local-persistent-storage traceoptions]
user@host# set file size 100m
```

NOTE: When a trace file (for example, sgw-lps-log) reaches its maximum size, it is renamed sgw-lps-log.0, then sgw-lps-log.1, and so on, until the maximum number of trace files is reached. The oldest archived file is then overwritten.

4. Configure the tracing flag.

```
[edit unified-edge gateways sgw MBG2 charging local-persistent-storage traceoptions]
user@host# set flag all
```

NOTE: You should use care when tracing all operations on a gateway. This can have a performance impact.

5. Configure the tracing level.

```
[edit unified-edge gateways sgw MBG2 charging local-persistent-storage traceoptions]
user@host# set level error
```

6. View the trace file.

```
user@host# file show /var/log/sgw-lps-log
```

**Related Documentation**


- Configuring Charging on page 287
- Configuring S-GW-Specific Charging Parameters on page 288
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- Configuring S-GW Charging Traceoptions on page 292
- Configuring GTP Prime for Transferring CDRs on page 297
- Configuring Persistent Storage on page 299
- Configuring Transport Profiles on page 303
- Configuring Charging Trigger Events on page 304
- Configuring CDR Attributes on page 306

- Configuring Charging Profiles on page 308
- Configuring Charging Profiles for APNs on page 309
- Tracing Charging Operations on page 310
- Charging Data Records on page 281
- Configuring S-GW Traceoptions on page 32
- Configuring S-GW Data Path Traceoptions on page 97
- Configuring S-GW GTP Traceoptions on page 270
- Configuring S-GW Charging Traceoptions on page 292


## Configuring GTP Prime for Charging

To configure GPRS tunneling protocol (GTP) Prime to transfer Charging Data Records (CDRs), perform these tasks:


- Configuring GTP Prime for Transferring CDRs on page 297
- Configuring GTP Prime Peers on page 298


### Configuring GTP Prime for Transferring CDRs

CDRs are transferred to a charging gateway using GTP Prime or logged to a Routing Engine hard disk and eventually retrieved by a charging gateway using FTP.

To configure global GTP Prime options to transfer CDRs:

1. Specify that you want to configure GTP Prime properties for the gateway called MBG1.

   [edit]
   user@host# **edit unified-edge gateways ggsn-pgw MBG1 charging gtpp**

2. Specify the destination port number of the charging gateway function (CGF) server.

   [edit unified-edge gateways ggsn-pgw MBG1 charging gtpp]
   user@host# **set destination-port** ***port-number***

3. Specify the source interface from which GTP Prime packets will be sent.

   [edit unified-edge gateways ggsn-pgw MBG1 charging gtpp]
   user@host# **set source-interface** ***interface-name*** **[***ipv4-address***]**

4. Specify the transport protocol.

   [edit unified-edge gateways ggsn-pgw MBG1 charging gtpp]
   user@host# **set transport-protocol (udp | tcp)**

5. Specify the GTP Prime version.

   [edit unified-edge gateways ggsn-pgw MBG1 charging gtpp]
   user@host# **set version (v0 | v1 | v2)**

6. Specify the GTP Prime header type.

   [edit unified-edge gateways ggsn-pgw MBG1 charging gtpp]
   user@host# **set header-type (long | short)**

7. Specify that path management is disabled. This option cannot be used with the echo request interval.

   [edit unified-edge gateways ggsn-pgw MBG1 charging gtpp]
   user@host# **set no-path-management**

8. Specify the GTP Prime echo request interval for path management.

   [edit unified-edge gateways ggsn-pgw MBG1 charging gtpp]
   user@host# **set echo-interval** ***seconds***

9. Specify the number of retries of GTP Prime messages upon timeout.

   [edit unified-edge gateways ggsn-pgw MBG1 charging gtpp]
   user@host# **set n3-requests** ***requests***

10. Specify the response timeout value for the GTP Prime request message.

    [edit unified-edge gateways ggsn-pgw MBG1 charging gtpp]
    user@host# **set t3-response** ***response-interval***

11. Specify the time to wait before declaring a CGF as down.

    [edit unified-edge gateways ggsn-pgw MBG1 charging gtpp]
    user@host# **set down-detect-time** ***seconds***

12. Specify the time after which to retry the connection to the CGF server.

    [edit unified-edge gateways ggsn-pgw MBG1 charging gtpp]
    user@host# **set reconnect-time** ***seconds***

13. Specify the maximum number of Data Record Transfer (DRT) messages awaiting an acknowledgment.

    [edit unified-edge gateways ggsn-pgw MBG1 charging gtpp]
    user@host# **set pending-queue-size** ***queue-size***

## Configuring GTP Prime Peers

CDRs are transferred to a charging gateway using GTP Prime. The charging gateway is the GTP Prime peer. The charging gateway peer inherits the global GTP Prime values. You configure the GTP Prime peer only if you want to override any of the global GTP Prime values.

To configure the GTP Prime peer to transfer CDRs:

1. Specify the name of the CGF peer for which you are configuring GTP Prime properties. Use this peer name to configure the peer order in the transport profile.

   [edit unified-edge gateways ggsn-pgw MBG1 charging gtpp]
   user@host# **edit peer** ***peer-name***

2. Specify the destination IPv4 address of the CGF peer.

   [edit unified-edge gateways ggsn-pgw MBG1 charging gtpp peer *peer-name*]
   user@host# **set destination-ipv4-address** ***ip-address***

3. (Optional) Specify any of the global GTP Prime options that you want to override for this charging gateway.

**Related Documentation**

- Configuring Charging on page 287
- Configuring Transport Profiles on page 303
- Charging Services Overview on page 279

## Configuring Persistent Storage

You can store Charging Data Records (CDRs) locally on the Routing Engine hard disk. You must configure the persistent storage order in the transport profile before CDRs can be stored locally on the Routing Engine.

To configure local persistent storage for the CDRs, perform these tasks:

- Configuring Local Persistent Storage on page 299
- Tracing Persistent Storage Operations on page 300

### Configuring Local Persistent Storage

To configure local persistent storage of the file containing the CDRs:

1. Specify that you want to configure local persistent storage.

   ```
   [edit]
   user@host# edit unified-edge gateways ggsn-pgw MBG1 charging
     local-persistent-storage-options
   ```

2. Specify the file age in minutes.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options]
   user@host# set file-age value
   ```

3. Specify the file size in MB.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options]
   user@host# set file-size value
   ```

4. Specify the number of CDRs for each file.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options]
   user@host# set cdrs-per-file value
   ```

5. Specify that CDR log files are not replicated to the standby Routing Engine.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options]
   user@host# set disable-replication
   ```

6. Specify the user authorized to access the files.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options]
   user@host# set user-name username
   ```

7. Specify that CDR log files can be accessed for reading by all users.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options]
   user@host# set world-readable
   ```

8. Specify the private extension for the filename.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options]
   ```

```
user@host# set file-name-private-extension string
```

9. Specify whether the CDR file is shared across all nodes for a charging group or is unique to a charging group in each node.

```
[edit unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options]
user@host# set file-creation-policy (unique-file | shared-file)
```

10. Configure the CDR file format as 3GPP 32 297 format or raw ASN.1 format.

```
[edit unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options]
user@host# set file-format (3gpp | raw-asn)
```

11. Configure the disk policy for when the disk runs out of space. Specify the percentage and notification for the watermark levels. Notification can be to generate an SNMP alarm, a syslog, or both.

```
[edit unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options]
user@host# set disk-space-policy watermark-level-1 (percentage) (syslog | snmp |
  alarm)
user@host# set disk-space-policy watermark-level-2 (percentage) (syslog | snmp |
  alarm)
user@host# set disk-space-policy watermark-level-3 (percentage) (syslog | snmp |
  alarm)
```

## Tracing Persistent Storage Operations

To configure tracing operations for local persistent storage:

1. Specify that you want to configure tracing options for charging operations.

```
[edit unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options]
user@host# edit traceoptions
```

2. (Optional) Configure the name for the file used for the trace output.

```
[edit unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options
  traceoptions]
user@host# set file filename
```

3. (Optional) Configure flags to filter the operations to be logged.

```
[edit unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options
  traceoptions]
user@host# set flag flag
```

By default, only important events are logged. You can specify which trace operations are logged by including specific tracing flags. The following table describes the flags that you can include.

| Flag | Description |
|---|---|
| **all** | Trace all operations |
| **connection** | Trace connection establishment between the Routing Engine and all session DPCs for CDR file backup |
| **file-operations** | Trace file operations (open, write, close) |

| Flag | Description |
|---|---|
| **general** | Trace miscellaneous operations |
| **journaling** | Trace file journaling operations |
| **mirror** | Trace mirroring operations |

4. (Optional) Configure the level of tracing.

```
[edit unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options
  traceoptions]
user@host# set level (all | critical | error | info | notice | verbose | warning)
```

**Related Documentation**

- Configuring the Solid State Disk for Persistent Storage on page 301
- Configuring Charging on page 287
- Configuring Transport Profiles on page 303
- Charging Services Overview on page 279
- Configuring S-GW-Specific Charging Parameters on page 288
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- Configuring S-GW Charging Traceoptions on page 292
- Configuring S-GW Charging Traceoptions on page 292

## Configuring the Solid State Disk for Persistent Storage

You can use the Solid State Disk (SSD) on the Routing Engine for local persistent storage. You must configure the SSD (part number SSD-CDR-S) before Charging Data Records (CDRs) can be stored locally on the Routing Engine.

NOTE: If you do not want to format the existing content on the SSD, you must specify the **no-format** option when preparing the SSD.

To use the SSD for local persistent storage of CDRs, perform these tasks:

- Initializing the Solid State Disk for Persistent Storage on page 301
- Ejecting the Solid State Disk on page 302
- Installing the Solid State Disk on page 302

### Initializing the Solid State Disk for Persistent Storage

If the SSD on the Routing Engine is not plugged in before you start storing CDRs locally on the Routing Engine, you must initialize the SSD.

To initialize the SSD for local persistent storage when it has not been installed in the Routing Engine:

1. Power down the Routing Engine by pressing the Online/Offline button or entering the **shutdown -h now** command.
2. Install the SSD. For information about installing the SSD, see "Replacing an SSD Drive on an RE-A-1800 or RE-S-1800" in the Hardware Guide for your MX Series router.
3. Boot the Routing Engine.
4. Prepare the SSD to store CDRs.

   user@host> **request system storage unified-edge media prepare**

   NOTE: If you do not want to format the existing content on the SSD, you must specify the **no-format** option.

5. Enable the SSD to start storing CDRs.

   user@host> **request system storage unified-edge charging media start**

## Ejecting the Solid State Disk

To eject the SSD from the Routing Engine:

1. Disable the SSD to close all open files and stop storing CDRs.

   user@host> **request system storage unified-edge charging media stop**

2. Prepare the SSD for removal from the Routing Engine.

   user@host> **request system storage unified-edge media eject**

3. Remove the SSD from the Routing Engine. For information about removing the SSD, see "Replacing an SSD Drive on an RE-A-1800 or RE-S-1800" in the Hardware Guide for your MX Series router.

## Installing the Solid State Disk

If the SSD on the Routing Engine is reinstalled on the Routing Engine after it was initialized, you must prepare the SSD to store CDRs.

To prepare the SSD for local persistent storage when it has been reinstalled on the Routing Engine:

1. Install the SSD. For information about installing the SSD, see "Replacing an SSD Drive on an RE-A-1800 or RE-S-1800" in the Hardware Guide for your MX Series router.
2. Prepare the SSD to store CDRs.

   user@host> **request system storage unified-edge media prepare**

   NOTE: If you do not want to format the existing content on the SSD, you must specify the **no-format** option.

3. Enable the SSD to start storing CDRs.

   user@host> **request system storage unified-edge charging media start**

4. Reboot the Routing Engine.

**Related Documentation**

- Configuring Persistent Storage on page 299
- request system storage unified-edge charging media start on page 1204
- request system storage unified-edge charging media stop on page 1205
- request system storage unified-edge media eject on page 1206
- request system storage unified-edge media prepare on page 1207

## Configuring Transport Profiles

A transport profile provides information for transporting the Charging Data Records (CDRs) from the charging data function (CDF) to the charging gateways or to local persistent storage. A transport profile can be associated with different charging profiles. You can define up to eight transport profiles.

To configure transport profiles:

1. Specify the name of the transport profile that you are configuring for the gateway called MBG1.

   [edit unified-edge gateways ggsn-pgw MBG1 charging]
   user@host# **edit transport-profiles** ***profile-name***

2. Specify a description for the profile.

   [edit unified-edge gateways ggsn-pgw MBG1 charging transport-profiles *profile-name*]
   user@host# **set description** ***string***

3. Configure offline charging in the transport profile.

   [edit unified-edge gateways ggsn-pgw MBG1 charging transport-profiles *profile-name*]
   user@host# **edit offline charging-gateways**

4. Configure the order in which the charging gateways are selected. The charging gateway must be defined as a GTP Prime peer. The highest-priority peer is selected first as the active charging gateway. When the active charging gateway goes down, the next higher-priority peer is selected. If all the charging gateways are down and you have configured local persistent storage, then the CDRs are stored on the Routing Engine.

   [edit unified-edge gateways ggsn-pgw MBG1 charging transport-profiles
   transport-profile1 offline charging-gateways]
   user@host# **set peer-order peer** ***charging-gateway-peer-name***

5. Specify the time the CDF must wait before switching back to a higher-priority peer from a lower-priority peer that has become the active charging gateway.

   [edit unified-edge gateways ggsn-pgw MBG1 charging transport-profiles
   transport-profile1 offline charging-gateways]
   user@host# **set switch-back-time** ***seconds***

6. Specify that the persistent storage order is local (on the Routing Engine). You must configure the persistent storage order before CDRs can be stored locally on the Routing Engine.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging transport-profiles
     transport-profile1 offline charging-gateways]
   user@host# set persistent-storage-order local-storage
   ```

7. Configure the CDR format version. The charging format implemented in the 3GPP Release 8 specifications (r8) is the default format version.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging transport-profiles
     transport-profile1 offline charging-gateways]
   user@host# set cdr-release (r99 | r7 | r8)
   ```

8. Specify the number of CDRs in one DRT message.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging transport-profiles
     transport-profile1 offline charging-gateways]
   user@host# set cdr-aggregation-limit value
   ```

9. Configure the maximum transmission unit (MTU) of the DRT message.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging transport-profiles
     transport-profile1 offline charging-gateways]
   user@host# set mtu value
   ```

**Related Documentation**

- Configuring Charging on page 287
- Configuring GTP Prime for Charging on page 297
- Configuring Persistent Storage on page 299
- Configuring Charging Profiles on page 308
- Charging Profiles on page 285
- Configuring S-GW-Specific Charging Parameters on page 288
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- Configuring S-GW Charging Traceoptions on page 292
- Configuring S-GW Charging Traceoptions on page 292

## Configuring Charging Trigger Events

A trigger profile defines the charging events that cause Charging Data Record (CDR) changes.

To configure trigger profiles:

1. Specify the name of the trigger profile that you are configuring for the gateway called MBG1.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging]
   user@host# edit trigger-profiles profile-name
   ```

2. Specify a description for the profile.

[edit unified-edge gateways ggsn-pgw MBG1 charging trigger-profiles *profile-name*]
user@host# **set description *string***

3. Configure offline charging in the trigger profile.

   [edit unified-edge gateways ggsn-pgw MBG1 charging trigger-profiles *profile-name*]
   user@host# **edit offline**

4. Specify a time limit for closing the container. A value of zero (0) disables this trigger.

   [edit unified-edge gateways ggsn-pgw MBG1 charging trigger-profiles *profile-name* offline]
   user@host# **set time-limit *seconds***

5. Specify the bearer information change that does not trigger charging data updates. All of these changes trigger a container or CDR closure by default.

   [edit unified-edge gateways ggsn-pgw MBG1 charging trigger-profiles *profile-name* offline]
   user@host# **set exclude *bearer-information-change***

   The following table describes the bearer information changes that can be ignored for charging data updates.

| Bearer Information Change | Description |
|---|---|
| **ms-timezone-change** | MS time zone |
| **plmn-change** | Public Land Mobile Network (PLMN) |
| **qos-change** | Quality of service (QoS) |
| **rat-change** | Radio Access Technology (RAT) |
| **sgsn-sgw-change** | SGSN or S-GW limit |
| **user-location-change** | User location information |

   For example:

   [edit unified-edge gateways ggsn-pgw MBG1 charging trigger-profiles *profile-name* offline]
   user@host# **set exclude user-location-change**

6. Specify a volume limit trigger for bandwidth, in bytes.

   [edit unified-edge gateways ggsn-pgw MBG1 charging trigger-profiles *profile-name* offline]
   user@host# **set volume-limit *value***

7. Specify the direction for the volume limit trigger. If you specify **both**, the volume limit applies to the combined amount of uplink and downlink traffic.

   [edit unified-edge gateways ggsn-pgw MBG1 charging trigger-profiles *profile-name* offline]
   user@host# **set volume-limit direction (both | uplink)**

8. Specify the maximum number of containers to limit for each CDR.

[edit unified-edge gateways ggsn-pgw MBG1 charging trigger-profiles *profile-name* offline]
user@host# **set container-limit** ***value***

9. Specify the number of SGSN or S-GW changes that can occur before the CDR is updated and closed. A value of zero (0) disables this trigger.

   [edit unified-edge gateways ggsn-pgw MBG1 charging trigger-profiles *profile-name* offline]
   user@host# **set sgsn-sgw-change-limit** ***value***

10. Configure the list of times to update CDRs when the tariffs change within a day. These times can be specified in a minimum of 15-minute increments. Specify the tariff time changes in the format *hh:mm*, where *hh* is 00 through 23 (00 is midnight) and *mm* is 00 through 59. The specified time is local time.

    [edit unified-edge gateways ggsn-pgw MBG1 charging trigger-profiles *profile-name*]
    user@host# **set tariff-time-list** ***hh:mm***

    For example:

    [edit unified-edge gateways ggsn-pgw MBG1 charging trigger-profiles *profile-name* tariff-time-list]
    user@host# **set tariff-time-list 21:00**
    user@host# **set tariff-time-list 07:00**

**Related Documentation**

- Configuring Charging on page 287
- Configuring Charging Profiles on page 308
- Charging Profiles on page 285
- Configuring S-GW-Specific Charging Parameters on page 288
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- Configuring S-GW Charging Traceoptions on page 292
- Configuring S-GW Charging Traceoptions on page 292

## Configuring CDR Attributes

A Charging Data Record (CDR) profile defines the attributes in each CDR.

To configure CDR profiles:

1. Specify the name of the CDR profile that you are configuring for the gateway called MBG1.

   [edit unified-edge gateways ggsn-pgw MBG1 charging]
   user@host# **edit cdr-profiles** ***profile-name***

2. Specify a description for the profile.

   [edit unified-edge gateways ggsn-pgw MBG1 charging cdr-profiles *profile-name*]
   user@host# **set description** ***string***

3. Enable reduced partial CDR (RPC) generation.

[edit unified-edge gateways ggsn-pgw MBG1 charging cdr-profiles *profile-name*]
user@host# **set enable-reduced-partial-cdrs**

4. Set optional information elements to exclude from the CDR. You can specify the excluded information elements so that you can manage the size of the CDR. By default, all informational elements are included in the CDR.

   [edit unified-edge gateways ggsn-pgw MBG1 charging cdr-profiles *profile-name*]
   user@host# **set exclude-ie-options [*information element*]**

   The following table describes the information elements that can be excluded from CDRs.

| Information Element | Information in CDRs |
|---|---|
| **apn-ni** | Access point name (APN) network identifier |
| **apn-selection-mode** | APN selection mode |
| **cc-selection-mode** | Charging characteristic selection mode |
| **dynamic-address** | Dynamic Packet Data Protocol (PDP) address indication |
| **list-of-service-data** | List of service data |
| **list-of-traffic-volumes** | List of traffic volumes |
| **lrsn** | Local record sequence number |
| **ms-time-zone** | Mobile station (MS) time zone |
| **network-initiation** | Network initiation flag |
| **node-id** | Node identifier |
| **pdn-connection-id** | Packet data network (PDN) connection ID |
| **pdppdn-type** | PDP or PDN type |
| **pgw-plmn-identifier** | Packet Data Network Gateway (P-GW) Public Land Mobile Network (PLMN) identifier field |
| **rat-type** | Radio Access Technology (RAT) type |
| **record-sequence-number** | Record sequence number |
| **served-imeisv** | Served International Mobile Equipment Identity and Software Version Number (IMEISV) |
| **served-msisdn** | Served mobile station ISDN (MSISDN) |
| **served-pdppdn-address** | Served PDP context or IP-CAN bearer address |

| Information Element | Information in CDRs |
|---|---|
| **serving-node-plmn-identifier** | Serving node PLMN identifier field |
| **start-time** | Time when session established; added to first CDR |
| **stop-time** | Time when session terminated; added to last CDR |
| **user-location-information** | User location information |

**Related Documentation**

- Configuring Charging on page 287
- Configuring Charging Profiles on page 308
- Charging Profiles on page 285
- Configuring S-GW-Specific Charging Parameters on page 288
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- Configuring S-GW Charging Traceoptions on page 292
- Configuring S-GW Charging Traceoptions on page 292

## Configuring Charging Profiles

A charging profile defines the charging behavior applied to a mobile subscriber. The charging profile includes a transport profile, a Charging Data Record (CDR) profile, a trigger profile, and other default service-aware charging information.

To configure charging profiles:

1. Specify the name of the charging profile that you are configuring for the gateway called MBG1.

   [edit unified-edge gateways ggsn-pgw MBG1 charging]
   user@host# **edit charging-profiles** ***profile-name***

2. Specify a profile identifier that is matched against the GPRS tunneling protocol (GTP) charging characteristic or authentication, authorization, and accounting (AAA) charging profile number. The profile identifier must be specified and it must be a unique value across all charging profiles defined for a gateway.

   [edit unified-edge gateways ggsn-pgw MBG1 charging charging-profiles *profile-name*]
   user@host# **set profile-id** ***profile-id***

3. Specify the transport profile referenced by this charging profile. The transport profile must be defined.

   [edit unified-edge gateways ggsn-pgw MBG1 charging charging-profiles *profile-name*]
   user@host# **set transport-profile** ***profile-name***

4. (Optional) Specify a description for the profile.

   [edit unified-edge gateways ggsn-pgw MBG1 charging charging-profiles *profile-name*]

```
user@host# set description string
```

5. (Optional) Specify the default rating group. This option is useful for the 3GPP Release 8 specifications or for generating a Release 7 service data container.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging charging-profiles profile-name]
   user@host# set default-rating-group integer
   ```

6. (Optional) Specify the default service identifier for the service or the service component. This option is useful for the 3GPP Release 8 specifications or for generating a Release 7 service data container.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging charging-profiles profile-name]
   user@host# set default-service-id integer
   ```

7. (Optional) Specify the CDR profile referenced by this charging profile. The CDR profile must be defined.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging charging-profiles profile-name]
   user@host# set cdr-profile profile-name
   ```

8. (Optional) Specify the trigger profile referenced by this charging profile. The trigger profile must be defined.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging charging-profiles profile-name]
   user@host# set trigger-profile profile-name
   ```

**Related Documentation**

- Configuring Charging on page 287
- Charging Profiles on page 285
- Configuring S-GW-Specific Charging Parameters on page 288
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- Configuring S-GW Charging Traceoptions on page 292
- Configuring S-GW Charging Traceoptions on page 292

## Configuring Charging Profiles for APNs

You can configure charging profiles that apply to access point names (APNs) that are used for the default profile, home subscribers, roaming subscribers, and visiting subscribers.

To configure charging profiles for APNs:

1. Specify that you want to configure charging profiles for a particular APN.

   ```
   [edit]
   user@host# edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-name
     charging
   ```

2. Specify the name of the default charging profile. The charging profile must be defined.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns apn-name charging]
   user@host# set default-profile profile-name
   ```

3. Specify the name of the charging profile for home subscribers roaming in other Public Land Mobile Networks (PLMNs). The charging profile must be defined.

   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns *apn-name* charging]
   user@host# **set home-profile** ***profile-name***

4. Specify the name of the charging profile for roaming subscribers between PLMNs. The charging profile must be defined.

   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns *apn-name* charging]
   user@host# **set roamer-profile** ***profile-name***

5. Specify the name of the charging profile for visiting subscribers from other PLMNs. The charging profile must be defined.

   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns *apn-name* charging]
   user@host# **set visitor-profile** ***profile-name***

6. Specify the profile selection order. You can order the selections by the charging profile sent by the RADIUS server (radius), the charging profile sent by the SGSN or Serving Gateway (serving), or the locally configured charging profile (static).

   [edit unified-edge gateways ggsn-pgw MBG1 apn-services apns *apn-name* charging]
   user@host# **set profile-selection-order [(serving | radius | static)]**

**Related Documentation**

- Configuring Charging on page 287
- Charging Profiles on page 285
- Configuring S-GW-Specific Charging Parameters on page 288
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- Configuring S-GW Charging Traceoptions on page 292
- Configuring S-GW Charging Traceoptions on page 292

## Tracing Charging Operations

Charging tracing operations track mobile charging operations and record them in a log file. The error descriptions captured in the log file provide detailed information to help you solve problems.

All log files are located in the **/var/log** directory. You cannot change the directory in which trace files are located. When the trace file reaches its maximum size, a **.0** is appended to the filename, then a new file is created with a **.1**, and finally a **.2**. When the maximum number of trace files is reached, the oldest trace file is overwritten.

NOTE: You should use care when tracing charging operations because it can have a performance impact.

To configure charging tracing operations:

1. Specify that you want to configure tracing options for charging operations.

```
[edit]
user@host# edit unified-edge gateways ggsn-pgw MBG1 charging traceoptions
```

2. (Optional) Configure the name for the file used for the trace output.
3. (Optional) Configure flags to filter the operations to be logged.

The mobile charging traceoptions configuration tasks are described in the following topics:

- Configuring the Trace Log Filename on page 311
- Configuring the Tracing Flags on page 311

## Configuring the Trace Log Filename

By default, the name of the file that records trace output for mobile charging is **mobile-smd**. You can specify a different name with the **file** option to distinguish trace output for different session Dense Port Concentrators (DPCs). For example, you can specify the filename in the format *filename*-ms*number*fpc*number*pic*number*.

To configure the filename for mobile charging tracing operations:

- Specify the name of the file used for the trace output.

```
[edit unified-edge gateways ggsn-pgw MBG1 charging traceoptions]
user@host# set file filename
```

## Configuring the Tracing Flags

To configure the flags for the events to be logged:

- Configure the flags.

```
[edit unified-edge gateways ggsn-pgw MBG1 charging traceoptions]
user@host# set flag flag
```

By default, only important events are logged. You can specify which trace operations are logged by including specific tracing flags. The following table describes the flags that you can include.

| Flag | Description |
|---|---|
| **all** | Trace all operations |
| **cdr-encoding** | Trace CDR encoding |
| **client-fsm** | Trace client finite state machine (FSM) |
| **config** | Trace configuration events |
| **fsm** | Trace FSM |
| **general** | Trace general flow |

| Flag | Description |
|---|---|
| **group-fsm** | Trace group FSM |
| **init** | Trace initialization events |
| **ipc** | Trace IPC |
| **path-management** | Trace path management module |
| **request** | Trace requests |
| **resource** | Trace resources |
| **response** | Trace responses |
| **timers** | Trace timers |
| **transport** | Trace transport group |
| **triggers** | Trace trigger information |

**Related Documentation**

- Configuring Charging on page 287
- Configuring S-GW-Specific Charging Parameters on page 288
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- Configuring S-GW Charging Traceoptions on page 292
- Configuring S-GW Charging Traceoptions on page 292

## Verifying and Managing the Charging Configuration

**Purpose** Display or clear information about the charging configuration.

**Action**

- To display information about the local persistent storage statistics:

  user@host> **show unified-edge ggsn-pgw charging local-persistent-storage statistics**
- To display information about the path management message statistics:

  user@host> **show unified-edge ggsn-pgw charging path statistics**
- To display information about the status of the configured peers:

  user@host> **show unified-edge ggsn-pgw charging path status**
- To display information about the transfer statistics for configured transport profiles:

  user@host> **show unified-edge ggsn-pgw charging transfer statistics**
- To display information about the transfer status for configured transport profiles:

  user@host> **show unified-edge ggsn-pgw charging transfer status**

- To display information about the trigger profiles:

  user@host> **show unified-edge ggsn-pgw charging trigger-profile**

- To clear the locally-stored CDRs:

  user@host> **clear unified-edge ggsn-pgw charging cdr**

- To clear the local persistent storage statistics:

  user@host> **clear unified-edge ggsn-pgw charging local-persistent-storage statistics**

- To clear the path management message statistics:

  user@host> **clear unified-edge ggsn-pgw charging path statistics**

- To clear the transfer statistics:

  user@host> **clear unified-edge ggsn-pgw charging transfer statistics**

**Related Documentation**

- Configuring Persistent Storage on page 299
- Configuring GTP Prime for Charging on page 297
- Configuring Transport Profiles on page 303
- Configuring Charging Trigger Events on page 304
- Configuring S-GW-Specific Charging Parameters on page 288
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- Configuring S-GW Charging Traceoptions on page 292
- Configuring S-GW Charging Traceoptions on page 292

PART 7

# Quality of Service Configuration

CHAPTER 12

# Configuring Quality of Service

# Quality of Service Overview

Quality of service (QoS) allows both subscribers and services to be differentiated. Premium subscribers can be prioritized over basic subscribers, while real-time services can be prioritized over non-real-time services. The importance of QoS increases during periods of congestion. An unloaded network can meet the needs of all subscribers and services. However, as the network load increases, the prioritization of traffic determines whether performance for subscribers and services can be maintained or will be degraded.

In a mobile network, network resources are shared among multiple services (including Internet, voice, video, e-mail, and file sharing), each of which has different QoS requirements in terms of required bit rates, acceptable packet loss rates, and packet delay. On the MobileNext Broadband Gateway, you configure QoS profiles and policies to define the QoS treatment for mobile subscribers in 3G and 4G networks.

This topic covers:



## Initial QoS

When a bearer is first established on the broadband gateway, an initial level of QoS is assigned to the bearer based on QoS attributes in the QoS information element (IE) that specify the traffic characteristics for a bearer. Traffic characteristics include delay class, reliability class, precedence class, and traffic class or traffic handling priority (3G subscribers) or QoS Class Identifier (QCI) (4G subscribers).

NOTE: For 3G subscribers, the broadband gateway converts the traffic class to a QCI based on the 3GPP specification 23.401 ANNEX E. For more information, see "QoS Parameters in 3G Networks" on page 319.

## Differentiated Services

The broadband gateway supports QoS using the Differentiated Services (DiffServ) model. The DiffServ model is a multiple-service model that addresses different QoS requirements. With DiffServ, the network tries to deliver a particular kind of service based on the QoS specified by each packet, for example, using the 6-bit DiffServ code point (DSCP) setting in IP packets.

Standards for Differentiated Services are described in the following documents:

- RFC 2474, *Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers*
- RFC 2475, *An Architecture for Differentiated Services*

## QoS Parameters in 3G Networks

In a 3G network, subscriber traffic is classified based on traffic classes. Each traffic class is associated with a maximum bit rate and (for GBR bearers) a guaranteed bit rate, which can be configured independently for uplink and downlink subscriber traffic. To define the packet-forwarding treatment for bearer requests received on the broadband gateway, you configure a QoS classifier profile to map each traffic class (and for the Interactive class, traffic class, and traffic handling priority) to a forwarding class and packet loss priority (PLP).

NOTE: If no classifier profile is configured on the broadband gateway to map the traffic classes to a forwarding class and packet loss priority, the classification specified in the bearer request, coming from either the Gn or Gi interface, is carried over.

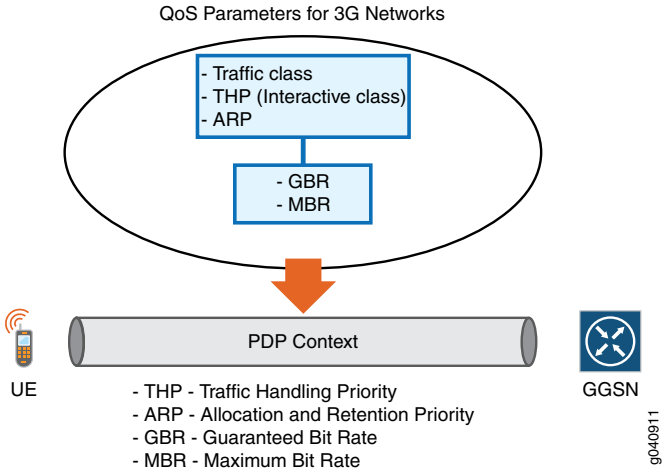
Table 46 on page 319 shows the supported traffic classes, as defined in the 3GPP standards.

### Table 46: Traffic Classes for 3G Networks

| Traffic Class | Description | Example Services |
|---|---|---|
| Conversational | Conversational pattern with very low delay and jitter. This is the most delay-sensitive traffic class. | Voice and real-time multimedia messaging such as VoIP and video conferencing. |
| Streaming | Delay and jitter requirements are not as strict as with conversational traffic class. | Streaming type applications such as video on demand. |
| Interactive | Interactive class enables prioritization between packet data protocol (PDP) contexts, which allows end-user or service prioritization. Interactive class is associated with a traffic handling priority (THP). THP values can be 1 through 3. | Streaming type applications such as video on demand, Web browsing, and Telnet. |
| Background | Best effort is acceptable for data delivery. This is the least delay-sensitive traffic class. | Background type applications such as e-mail and FTP. |

A policy profile defines the QoS treatment to apply for each traffic class or traffic handling priority. Figure 47 on page 320 shows the QoS parameters that the broadband gateway evaluates to determine whether to limit, upgrade, or reject an incoming PDP context request.

Figure 47: Key QoS Parameters for PDP Context Requests




The guaranteed bit rate (GBR), shown in Figure 47 on page 320, defines the minimum bit rate that is expected to be available to the PDP context when required. The GBR signifies that a certain amount of bandwidth is reserved for the PDP context, regardless of whether or not the GBR is used. Consequently, a PDP context with a GBR always takes up resources even when no traffic is forwarded. Under normal operating conditions, the PDP context should not experience any packet loss due to congestion on the network. This is ensured because the PDP context is subject to admission control during initial setup, and a network allows the PDP context with a GBR only if sufficient resources are available. You can specify the GBR independently for uplink and downlink traffic.

The maximum bit rate (MBR), shown in Figure 47 on page 320, defines the maximum bit rate that is expected to be available to the PDP context when required. An MBR limits the bit rate that will be provided to a PDP context. Any traffic that exceeds the MBR can be dropped. You can specify the MBR independently for uplink and downlink traffic.

## Default Conversion of (3G) Traffic Classes to (4G) QoS Class Identifiers on the Broadband Gateway

For 3G subscribers, the broadband gateway converts the traffic class to a QCI, based on the 3GPP specification 23.401 ANNEX E. Table 47 on page 320 shows the mapping between standardized QCI values and the Release 99 (GTPv1) QoS parameters.

Table 47: Mapping of Traffic Classes to Qos Class Identifiers

| QCI | Traffic Class | Traffic Handling Priority | Signaling Indication | Source Statistics Descriptor |
|---|---|---|---|---|
| 1 | Conversational | N/A | N/A | Speech. |
| 2 | Conversational | N/A | N/A | Unknown.<br><br>NOTE: When QCI 2 is mapped to pre-Release 8 QoS parameter values, the Transfer Delay parameter is set to 150 ms. When pre-Rel-8 QoS parameter values are mapped to a QCI, QCI 2 is used for conversational/unknown if the Transfer Delay parameter is greater or equal to 150 ms. |

Table 47: Mapping of Traffic Classes to Qos Class Identifiers *(continued)*

| | | | | |
|---|---|---|---|---|
| 3 | Conversational | N/A | N/A | Unknown.<br><br>NOTE: When QCI 3 is mapped to pre-Release 8 QoS parameter values, the Transfer Delay parameter is set to 80 ms as the lowest possible value, according to TS 23.107 [54]. When pre-Release 8 QoS parameter values are mapped to a QCI, QCI 3 is used for conversational/unknown if the Transfer Delay parameter is lower than 150 ms. |
| 4 | Streaming | N/A | N/A | Unknown.<br><br>NOTE: When QCI 4 is mapped to pre-Release 8 QoS parameter values, it is mapped to Streaming/Unknown. When pre-Release 8 QoS parameter values are mapped to a QCI, Streaming/Unknown and Streaming/Speech are both mapped to QCI 4. |
| 5 | Interactive | 1 | Yes | N/A |
| 6 | Interactive | 1 | No | N/A |
| 7 | Interactive | 2 | No | N/A |
| 8 | Interactive | 3 | No | N/A |
| 9 | Background | N/A | N/A | N/A |

## QoS Parameters in 4G Networks

In a 4G network, subscriber traffic is classified based on the QoS Class Identifier (QCI), which is associated with priority, specify delay, and packet loss values, and determines the user plane treatment for IP packets transported on a bearer. The QCI determines which bearers are categorized as GBR (dedicated) and which are categorized as non-GBR (default). The broadband gateway supports only default bearers, which correspond to QCI values 5 through 9. The broadband gateway does not support dedicated bearers, which correspond to QCI values 1 through 4. Table 48 on page 321 shows the supported QoS Class Identifiers and the associated set of QoS characteristics, as defined in the 3GPP standards.

Table 48: QoS Class Identifiers for 4G Networks

| Qos Class Identifier | Priority | Packet Delay (in milliseconds) | Packet Error Loss Rate | Example Services |
|---|---|---|---|---|
| 5 | 1 | 100 ms | $10^{-6}$ | IP Multimedia Subsystem (IMS) signaling |
| 6 | 7 | 10 ms | $10^{-3}$ | Voice, video (live streaming), Interactive gaming |

Table 48: QoS Class Identifiers for 4G Networks *(continued)*

| | | | | |
|---|---|---|---|---|
| 7 | 6 | 300 ms | $10^{-6}$ | Video (buffered streaming), TCP-based (e-mail, chat, FTP, P2P file sharing) |
| 8 | 8 | | | |
| 9 | 9 | | | |

The priority associated with each QCI is applied when packets are forwarded across the network. Higher-priority packets are transferred before lower-priority packets.

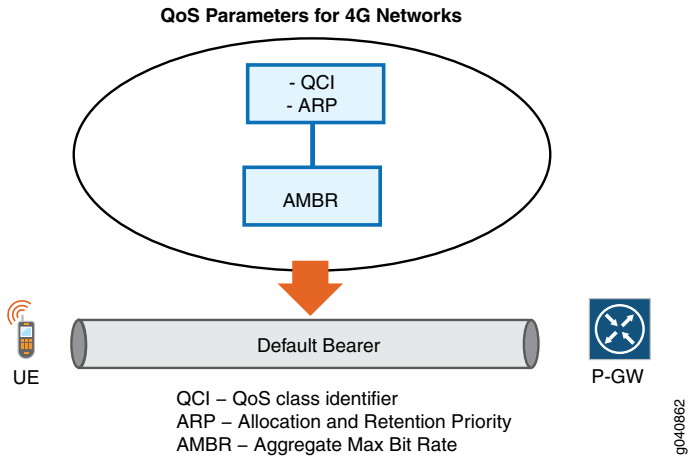
The packet delay budget associated with each QCI defines an upper boundary for the packet delay between the user equipment and the policy and charging enforcement function (PCEF) within the broadband gateway.

The packet error loss rate defines the percentage of higher layer packets—for example, IP packets—that are lost during periods when the network is not congested.

NOTE: To define the packet-forwarding treatment for bearer requests received on the broadband gateway, each QCI must be mapped to a forwarding class and packet loss priority (PLP) in the QoS classifier profile. If a QCI is not mapped to a forwarding class and PLP, the classification specified in the bearer request, coming from either the S5 or SGi interface, is carried over.

A policy profile defines the QoS treatment to be applied to default bearer requests based on the configured QoS parameters. Figure 48 on page 322 shows the QoS parameters that the broadband gateway processes to determine whether to limit, upgrade, or reject bearer requests.

Figure 48: Key QoS Parameters for 4G Default Bearer Requests




Each default bearer is associated with a QCI value, aggregate maximum bit rate (AMBR), and allocation and retention priority (ARP) value.

## Aggregate Maximum Bit Rate

The aggregate maximum bit rate (AMBR) defines the maximum allowed throughput for user equipment (UE) based on the sum of all total bit rates that all non-GBR bearers associated with an access point name (APN) are allowed to use. Thus the AMBR limits the total non-GBR traffic for an APN. You can configure the AMBR independently for uplink and downlink traffic.

## Allocation and Retention Priority

The allocation and retention priority (ARP) indicates a priority level for the allocation and retention of bearers. The mobile network uses ARP to decide whether to accept a request to establish a bearer, or reject the request when resources are limited. When performing admission control and network resources are limited, the network uses the ARP to prioritize establishing or modifying bearers with a higher ARP (lower numerically) over bearers with a lower ARP. The more sensitive the QoS application, the lower the corresponding PL or ARP value.

In a 4G network, ARP priority level (PL) values range from 1 through 15, where 1 corresponds to the highest priority and 15 corresponds to the lowest priority. In a 3G network, GTPv1 (pre-Release 9) ARP values range from 1 through 3, where 1 corresponds to the highest priority and 3 corresponds to the lowest priority. By default, the broadband gateway converts GTPv1 pre-Release 9 ARP values to Release 9 ARP values, based on the 3GPP specification 23.401 ANNEX E. Table 49 on page 323 shows how the broadband gateway maps GTPv1 pre-Release 9 bearer parameter ARP values to Release 9 GTPv2 ARP values.

### Table 49: Conversion of GTPv1 Pre-Release 9 ARP Values to Release 9 ARP Values

| GTPv1 Pre-release 9 ARP | GTPv1/v2 Release 9 ARP |
|---|---|
| 1 | 1 |
| 2 | 6 |
| 3 | 11 |

Conversely, when subscriber calls come in with a pre-Release 9 ARP value, the broadband gateway performs the required ARP conversion to ensure that the call goes back out with the appropriate ARP value. Table 50 on page 323 shows how the broadband gateway converts GTPv2 Release 9 bearer parameter ARP values to GTPv1 pre-Release 9 ARP values.

### Table 50: Mapping of Release 9 ARP Values to Pre-Release 9 ARP Values

| GTPv2 Release 9 ARP | GTPv1 Pre-Release 9 ARP |
|---|---|
| 1-5 | 1 |
| 6-10 | 2 |
| 11-15 | 3 |

## Preemption

The broadband gateway uses ARP values to manage the allocation and retention of resources for bearers. When preemption is enabled, the broadband gateway evaluates the priority level (PL) and the preemption vulnerability (PVI) and preemption capability (PCI) flags in the GTPv2 information element (IE) to determine whether a bearer is a candidate for deletion:

- PCI—Preemption capability information determines whether a bearer with a lower PL priority level should be dropped to free up the required resources.
- PVI—Preemption vulnerability information determines whether a bearer is a candidate for dropping by another preemption capable bearer with a higher PL value.
- PL—Priority level information defines the allocation and retention priority of the bearer.

NOTE: **For GTPv1 pre-Release9 PDP contexts, the broadband gateway uses ARP values to determine the preemption capability and preemption vulnerability. By default, preemption capability and preemption vulnerability are enabled. Optionally, you can configure the gtpv1-pci-disable and gtpv1-pvi-disable options to disable preemption capability and/or preemption vulnerability.**

**Related Documentation**

- Call Admission Control Overview on page 324
- Class of Service (CoS) Policy Profile Overview on page 327
- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- Configuring QoS on the Broadband Gateway Overview on page 333
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Call Admission Control Overview

Call admission control (CAC) on the MobileNext Broadband Gateway ensures that required network resources are available for real-time data traffic such as voice and video. CAC maintains information about all resources available on the broadband gateway and resources that have been allocated to bearers. Call admission is based on resource availability and the priority of the bearer, and allows the broadband gateway to reject or downgrade (Create or Modify) bearer requests when the CPU, memory, or bearer load for upstream or downstream traffic exceeds configured CAC thresholds.

This topic covers:

- Enforcing Call Admission Control on page 325
- Managing Bandwidth on page 325
- Managing the Number of Bearers on page 325

## Enforcing Call Admission Control

Call admission control is enforced only when a local policy profile is configured at the system level or access point name (APN) level on the broadband gateway.

## Managing Bandwidth

A bandwidth pool limits the number of guaranteed bit rate (GBR) bearers that can be supported on the broadband gateway (at the APN level or system level) per traffic class. Because a broadband gateway provides a limited amount of bandwidth, it must keep track of the amount of allocated bandwidth when receiving create/update PDP context requests with GBR requirements.

NOTE: **You configure bandwidth pools to provide GBR requirements for 3G networks.**

When admitting bearers, and especially bearers with GBR requirements, the broadband gateway must reject requests when the bandwidth requirements cannot be guaranteed. However, the bandwidth guarantees are only soft guarantees in that the broadband gateway can only restrict the total bandwidth guaranteed to the bearers; no hardware resources are allocated in the system for a bearer with a GBR.

Bandwidth is reserved at the system level or access point name (APN) level based on where the local policy is configured. A local policy configured at the system level specifies a bandwidth pool for all APNs that do not have an explicitly configured bandwidth pool. A bandwidth pool associated with multiple APNs is shared among all bearers of those APNs. A local policy configured at the APN level specifies a bandwidth pool reserved for bearers associated with the specific APN.

## Managing the Number of Bearers

A broadband gateway provides resource control for the number of bearers. In the control plane and data plane, a set of resources is allocated to each bearer regardless of the bandwidth requirements for the bearer, and the broadband gateway should always specify the maximum number of bearers allowed at the system level, or APN level, or both. When the number of bearers at the system level or APN level reaches the maximum limit, no bearer requests other than delete bearer requests are allowed.

## Managing Resource Thresholds

You configure the following parameters for resource thresholds to control traffic flow at either the system level or APN level:

- Bearer load—Specifies a more precise level of admission control when bearer load reaches a configured lower or upper threshold.
- Memory load—Specifies a more precise level of admission control when memory utilization reaches a configured lower or upper threshold.

- CPU load—Specifies a more precise level of admission control when CPU load reaches a configured lower or upper threshold.

Each threshold parameter includes a low and high threshold setting that is associated with an allocation and retention priority (ARP).

NOTE: When subscriber traffic on the broadband gateway exceeds the configured low or high resource threshold settings, only Create Session requests with a higher-priority ARP (GTPv1) or PL (GTPv2) are allowed. When the limits for bearer, CPU, or memory load exceed the configured threshold limits, the broadband gateway can preempt bearers with a lower priority.

## Default Resource Threshold Settings

If you do not explicitly configure resource threshold settings on the broadband gateway, the following resource threshold default values apply:

- CPU and bearer load default values:
  - High threshold—85 percent
  - High threshold priority level—5
  - Low threshold—70 percent
  - Low threshold priority level—10
- Memory load default values:
  - High threshold—90 percent
  - High threshold priority level—5
  - Low threshold—80 percent
  - Low threshold priority level—10

**Related Documentation**

- Quality of Service Overview on page 318
- Class of Service (CoS) Policy Profile Overview on page 327
- Policing Subscriber Traffic on the Broadband Gateway Overview on page 328
- Configuring QoS on the Broadband Gateway Overview on page 333
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Class of Service (CoS) Policy Profile Overview

You configure a CoS policy profile to define additional call admission control characteristics that the MobileNext Broadband Gateway uses during call setup to decide whether to admit a bearer.

A CoS policy profile manages the following resources and settings:

- Maximum QoS Class Identifier (QCI)—Any default bearer set up with a QCI value that is of a higher priority (numerically lower) than the configured maximum QCI value is downgraded by default. A Modify bearer request that specifies a higher-priority QCI than the configured maximum QCI will be downgraded to a maximum QCI value. Optionally, you can configure the broadband gateway to allow bearers with a lower-priority QCI than the configured value to be upgraded or rejected.
- Maximum (non-GBR) traffic class—Any bearer set up with a traffic class or traffic handling priority that is of a higher traffic class than the configured maximum traffic class (mapped to a QCI value 5 through 9) is downgraded by default. A modify bearer request that is of a higher traffic class than the configured maximum traffic class is downgraded to the maximum traffic class. Optionally, you can configure the broadband gateway to allow bearer requests of a lower traffic class to be upgraded or rejected.
- Aggregate maximum bit rate (AMBR)—In a 4G network, the AMBR specifies the total maximum bit rate for all default bearers associated with a specific gateway or access point name (APN). A bearer request that specifies a higher AMBR than the configured value is downgraded by default. Optionally, you can configure the broadband gateway to allow bearers with a higher AMBR than the configured value to be upgraded or rejected. You can configure different AMBR values for uplink and downlink traffic.
- Maximum bit rate (MBR)—In a 3G network, each traffic class specifies the maximum bit rate allowed. A bearer request that specifies a higher MBR than the configured maximum value is downgraded by default. Optionally, you can configure the broadband gateway to allow bearers with a lower MBR than the configured value to be upgraded or rejected. You can configure different maximum bit rates for uplink and downlink traffic.
- Guaranteed bit rate (GBR)— In a 3G network, the conversational and streaming traffic classes specify the maximum guaranteed bit rate allowed. A bearer request that specifies a higher GBR than the configured maximum value is downgraded by default. Optionally, you can configure the broadband gateway to allow bearers with a lower GBR than the configured value to be upgraded or rejected. You can configure different guaranteed bit rates for uplink and downlink traffic.

**Related Documentation**

- Quality of Service Overview on page 318
- Call Admission Control Overview on page 324
- Configuring QoS on the Broadband Gateway Overview on page 333
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Policing Subscriber Traffic on the Broadband Gateway Overview

To enforce bandwidth limits for subscriber traffic on the MobileNext Broadband Gateway, you configure the policer action to apply to traffic that exceeds the maximum or guaranteed bit rates. The policer actions control packet behavior by transmitting or changing the packet loss priority (PLP) of packets when the subscriber traffic exceeds configured limits.

The broadband gateway uses a two-rate policer to enforce bandwidth rates.

For non-GBR bearers, you configure the **violate-action** option to specify how bearer data is treated when it exceeds the maximum bit rate (MBR) value with which a PDP context was established or the aggregate maximum bit rate (AMBR) value with which a default bearer was established. For GBR bearers, you configure the **violate-action** option to specify how bearer data is treated traffic exceeds the configured MBR and the **exceed-action** option to define how guaranteed bit rate (GBR) bearer data is treated when the GBR exceeds the GBR value with which the PDP context was established.

For non-GBR bearers, **violate-action** option allows either of the following actions for bearers that exceed the AMBR (4G) or MBR (3G):

- Transmit the packet without changing the PLP
- Set the PLP to “high.”

NOTE: **The default behavior of violate-action is drop. Data that exceeds the MBR is dropped by default. Data within the MBR is transmitted with PLP set to “high.”**

For GBR bearers (3G subscribers), the broadband gateway supports the following options:

- **exceed-action**—Specifies one of the following actions for bearers that exceed the GBR:
  - Set the PLP to “high” (the default).
  - Transmit the packet without changing the PLP.
- **violate-action**—Specifies one of the following actions for bearers that exceed the MBR:
  - Set the PLP to “high.”
  - Transmit the packet without changing PLP.

NOTE: **The default behavior of exceed-action is to set the PLP to “high” and violate-action is to drop. Data that exceeds the GBR but is within the MBR is transmitted with PLP set to “high”. Data that exceeds the MBR is dropped.**

**Related Documentation**

- Quality of Service Overview on page 318
- Call Admission Control Overview on page 324
- Class of Service (CoS) Policy Profile Overview on page 327
- Configuring QoS on the Broadband Gateway Overview on page 333
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Applying Rewrite Rules on Mobile Interfaces Overview

For each mobile interface on the MobileNext Broadband Gateway (one mobile interface per access point name [APN]), you must configure ingress and egress rewrite rules and apply them to the interfaces. This provides the required DSCP marking for subscriber packets. The rewrite rules that you configure and apply to a mobile interface provides the required DSCP marking for all subscriber packets associated with the APN to which the mobile interface maps.

An ingress rewrite rule (**ingress-rewrite-rules**) sets the type-of-service (ToS) bits based on the forwarding class and loss priority of the upstream subscriber packet received on the mobile interface. For upstream traffic, the rewrite rule is applied to packets exiting the anchor Packet Forwarding Engine towards the Gn or S5 interface. The ingress rewrite rule writes into the outer IP header only.

An egress rewrite rule (**rewrite-rules**) sets the ToS bits based on the forwarding class and loss priority of a downstream subscriber packet received on the mobile interface. For downstream subscriber traffic, the rewrite rule is applied to packets exiting the (egress) anchor Packet Forwarding Engine towards the Gi or SGi interface. An egress rewrite rule writes into the outer IP header, and optionally, inner IP header for the GPRS tunneling protocol (GTP) packet.

NOTE: **Egress rewrite rules must not be applied to the Ethernet interfaces on MX Series routers that receive downstream subscriber traffic from the broadband gateway. If configured, egress rewrite rules on the Ethernet interface will overwrite the QoS treatment configured on the broadband gateway for subscriber packets.**

**Related Documentation**

- Quality of Service Overview on page 318
- Call Admission Control Overview on page 324
- Class of Service (CoS) Policy Profile Overview on page 327
- Configuring QoS on the Broadband Gateway Overview on page 333
- Understanding Upstream and Downstream Processing of ToS Values in GTP-U Packets on page 330
- Configuring S-GW-Specific CAC Parameters on page 396

- Example: Configuring QoS and CAC on a S-GW on page 397


## Understanding Upstream and Downstream Processing of ToS Values in GTP-U Packets

To provide the required QoS treatment for upstream and downstream subscriber traffic, GTP-U packets are processed at multiple points in the data path.

This topic describes the upstream and downstream operations performed on GTP-U packets on the MobileNext Broadband Gateway.


- Processing of ToS Values for Upstream Subscriber Packets on page 330
- Processing of ToS Values for Downstream Subscriber Packets on page 331


### Processing of ToS Values for Upstream Subscriber Packets

The broadband gateway processes upstream GTP-U packets from a Gn/S5 interface to a Gi/SGi interface.

The following steps describe the processing of type-of-service (ToS) values for upstream GTP-U packets:

1. A GTP-U packet arrives on the mobile (Ethernet) interface, and a behavior aggregate (BA) classifier evaluates the ToS value of the subscriber packet to derive an appropriate Junos OS forwarding class and packet loss priority (PLP).
2. The GTP-U packet is sent to the appropriate queue on the Packet Forwarding Engine. (The forwarding class determines the queue.)
3. The packet is sent to the anchor Packet Forwarding Engine where the GTP packet header is decapsulated.

   NOTE: **A classifier profile must be configured on the broadband gateway to provide a mapping from a traffic class/QCI to a forwarding class and PLP.**

4. Subscriber tunnel endpoint identifier (TEID) lookup identifies the traffic class or QCI for the packet. The traffic class or QCI is mapped to a forwarding class and PLP, based on the classifier profile configured on the broadband gateway.
5. The packet is sent out on the anchor Packet Forwarding Engine where the egress rewrite rule applied on the mobile interface takes the forwarding class and PLP (Step 4) as input values to derive the appropriate DSCP marking before sending the packet to the SGi/Gi interface.

   NOTE: **An egress rewrite rule must be configured and applied to each mobile interface to provide the required DSCP marking for subscriber traffic.**

6. The packet is sent out on the correct Gi or SGi interface.

## Processing of ToS Values for Downstream Subscriber Packets

The broadband gateway processes downstream GTP-U packets from a Gi or SGi to a Gn or S5 interface.

The following steps describe the processing of ToS values for downstream GTP-U packets:

1. The GTP-U packet arrives from the Gi or SGi interface, and is sent to the anchor Packet Forwarding Engine associated with the virtual routing and forwarding (VRF) route.
2. On the anchor Packet Forwarding Engine, an IP address lookup identifies the TEID for the GTP header and, before encapsulation, the traffic class/QCI maps to a forwarding class and PLP, based on the classifier profile configured on the broadband gateway.
3. The packet is sent out from the anchor Packet Forwarding Engine where the ingress rewrite rule applied on the mobile interface takes the forwarding class and PLP (Step 2) as input values to derive the appropriate DSCP marking.
4. The packet is encapsulated with TEID and outer IP address in the GTP header, which is used for route table lookup for the SGSN/S-GN and sent to the egress Packet Forwarding Engine interface.
5. The packet is sent out on the correct Gn or S5 interface.

**Related Documentation**

- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Understanding How NQN and Upgrade Flags in PDP Contexts Affect QoS Upgrade Behavior

GTPv1 subscriber packets that contain NQN and Upgrade flags in Create/Update PDP context requests can affect the QoS treatment during processing on the MobileNext Broadband Gateway. Consequently, incoming requests might not be upgraded even though the local policy configured on the broadband gateway warrants an upgrade of the traffic class, maximum bit rate, or ARP for subscriber packets.

Figure 49 on page 332 shows how negotiated QoS values are affected based on the presence of NQN or Upgrade flags in Create/Update PDP context requests.

## Figure 49: QoS Negotiation Behavior for PDP Contexts with NQN and Upgrade Flags

| Case | GTP Message | Upgrade Flag | NQN | Local Policy | Requested QoS | Response | Local Policy | Requested QoS | Response | Local Policy | Requested QoS | Response |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0- False, 1- True | | | | | | | | | | |
| 1 | Create | 0 | 0 | 1024-Upgrade | 512 | 512 | TC-Upgrade | interactive | interactive | ARP-Upgrade | 2 | 2 |
| 2 | Create | 0 | 0 | 1024-Upgrade | 1500 | 1024 | TC-Upgrade | conv | streaming | ARP-Upgrade | 1 | 2 |
| 3 | Create | 1 | 0 | 1024-Upgrade | 512 | 1024 | TC-Upgrade | interactive | streaming | ARP-Upgrade | 3 | 2 |
| 4 | Create | 1 | 0 | 1024-Upgrade | 1500 | 1024 | TC-Upgrade | conv | streaming | ARP-Upgrade | 1 | 2 |
| 5 | Create | 0 | 0 | 1024-Downgrade | 512 | 512 | TC-Downgrade | interactive | interactive | ARP-Downgrade | 3 | 3 |
| 6 | Create | 0 | 0 | 1024-Downgrade | 1500 | 1024 | TC-Downgrade | conv | streaming | ARP-Downgrade | 1 | 2 |
| 7 | Create | 1 | 0 | 1024-Downgrade | 512 | 512 | TC-Downgrade | interactive | interactive | ARP-Downgrade | 3 | 3 |
| 8 | Create | 1 | 0 | 1024-Downgrade | 1500 | 1024 | TC-Downgrade | conv | streaming | ARP-Downgrade | 1 | 2 |
| 9 | Update | 0 | 0 | 1024-Upgrade | 512 | 512 | TC-Upgrade | interactive | interactive | ARP-Upgrade | 3 | 3 |
| 10 | Update | 0 | 0 | 1024-Upgrade | 1500 | 1024 | TC-Upgrade | conversational | streaming | ARP-Upgrade | 1 | 2 |
| 11 | Update | 1 | 0 | 1024-Upgrade | 512 | 512 | TC-Upgrade | interactive | interactive | ARP-Upgrade | 3 | 3 |
| 12 | Update | 1 | 0 | 1024-Upgrade | 1500 | 1024 | TC-Upgrade | conversational | streaming | ARP-Upgrade | 1 | 2 |
| 13 | Update | 0 | 1 | 1024-Upgrade | 512 | 512 | TC-Upgrade | interactive | interactive | ARP-Upgrade | 3 | 3 |
| 14 | Update | 0 | 1 | 1024-Upgrade | 1500 | REJECT | TC-Upgrade | conversational | reject | ARP-Upgrade | 1 | reject |
| 15 | Update | 1 | 1 | 1024-Upgrade | 512 | 512 | TC-Upgrade | interactive | interactive | ARP-Upgrade | 3 | 3 |
| 16 | Update | 1 | 1 | 1024-Upgrade | 1500 | REJECT | TC-Upgrade | conversational | reject | ARP-Upgrade | 1 | reject |
| 17 | Update | 0 | 0 | 1024-Downgrade | 512 | 512 | TC-Downgrade | interactive | interactive | ARP-Downgrade | 3 | 3 |
| 18 | Update | 0 | 0 | 1024-Downgrade | 1500 | 1024 | TC-Downgrade | conversational | streaming | ARP-Downgrade | 1 | 2 |
| 19 | Update | 1 | 0 | 1024-Downgrade | 512 | 512 | TC-Downgrade | interactive | interactive | ARP-Downgrade | 3 | 3 |
| 20 | Update | 1 | 0 | 1024-Downgrade | 1500 | 1024 | TC-Downgrade | conversational | streaming | ARP-Downgrade | 1 | 2 |
| 21 | Update | 0 | 1 | 1024-Downgrade | 512 | 512 | TC-Downgrade | interactive | interactive | ARP-Downgrade | 3 | 3 |
| 22 | Update | 0 | 1 | 1024-Downgrade | 1500 | REJECT | TC-Downgrade | conversational | reject | ARP-Downgrade | 1 | reject |
| 23 | Update | 1 | 1 | 1024-Downgrade | 512 | 512 | TC-Downgrade | interactive | interactive | ARP-Downgrade | 3 | 3 |
| 24 | Update | 1 | 1 | 1024-Downgrade | 1500 | REJECT | TC-Downgrade | conversational | reject | ARP-Downgrade | 1 | reject |

For Create PDP context requests arriving on the broadband gateway, the NQN and Upgrade flags can affect QoS negotiation as follows:

The Upgrade flag in a Create PDP context affects the upgrade behavior configured in the local policy for MBR, GBR, traffic class, and ARP value.

- For Cases 1 and 3 in Figure 49 on page 332, the QoS response results are different because the Upgrade Flag is set for Case 3. For example, MBR 512 versus 1024, traffic class interactive versus streaming, and ARP upgrade occurs for Case 3 only.
- For Cases 9 and 11 in Figure 49 on page 332, the combination of NQN and Upgrade flags in the Update PDP context prevent the expected upgrade of requested QoS values for MBR, traffic class, and ARP behavior, as configured in the local policy.

NOTE: **The Upgrade flag in a Create PDP context does not affect the downgrade behavior configured in the local policy.**

For Update PDP context requests arriving on the broadband gateway, the NQN and Upgrade flags can also affect QoS negotiation. For example, for Cases 14 and 16 in Figure 49 on page 332, the request is rejected because the NQN flag is set.

NOTE: **The Upgrade flag in a Update PDP context does not affect the downgrade behavior configured in the local policy.**

**Related Documentation**

- Class of Service (CoS) Policy Profile Overview on page 327
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Configuring QoS on the Broadband Gateway Overview

Configuring quality of service (QoS) on the MobileNext BroadBand Gateway for a 3G or 4G network is a multistep process in which you configure the resource threshold profiles, classifier profiles, and CoS policy profiles that are then specified in local policies to provide call admission control (CAC) and prioritization of subscriber traffic when the network load increases.

The following steps describe the high-level process for configuring QoS for 3G and 4G networks:

1. Configure the number of bearers at the system level or access point name (APN) level.
2. Configure bandwidth pools to ensure that sufficient bandwidth is available when guaranteed bit rate (GBR) packet data protocol (PDP) contexts are created or modified. Call admission control (CAC) uses bandwidth pools to either accept or reject the GBR PDP contexts based on availability of bandwidth, or to negotiate and reserve the bandwidth.
3. Configure preemption at the gateway level to enable preemption for GTPv2 bearers. For GTPv1 pre-Release 9 PDP contexts, you can enable preemption capability and preemption vulnerability independently. The broadband gateway uses ARP values to manage the allocation and retention of resources for bearers. When preemption is enabled, the broadband gateway evaluates the priority level (PL) and the preemption vulnerability (PVI) and preemption capability (PCI) flags in the GTPv2 information element (IE) to determine whether a bearer is a candidate for deletion.

   NOTE: **Preemption is disabled by default.**

4. Configure a resource threshold profile to define call admission control to manage load thresholds for the number of bearers, memory load, and CPU load.
5. Configure a classifier profile—Each traffic class or traffic handling priority (3G) and QoS Class Identifier (QCI) (4G) is mapped to a forwarding class and packet loss priority (PLP).

   NOTE: **For 3G bearers, the broadband gateway converts the traffic class to a QCI based on the 3GPP specification 23.401 ANNEX E. Thus, to configure packet forwarding for 3G traffic classes, you map the forwarding class and PLP for the QCI that maps to a traffic class. For more information about how 3G traffic classes are mapped to QCI values, see** **"Quality of Service Overview" on page 318****.**

   NOTE: **You can configure separate classifier profiles for home, roaming, and visitor subscriber traffic.**

6. Configure a class-of-service (CoS) policy profile to define how traffic is divided into classes and specify whether to upgrade or limit bearer requests based on availability of system resources.

   NOTE: You can configure separate CoS policy profiles for home, roaming, and visitor subscriber traffic.

7. Configure a local policy to define overall QoS treatment for subscriber traffic in 3G networks or 4G networks. A local policy includes the configuration of bandwidth pools (for uplink and downlink), classifier profiles, a resource threshold profile, and CoS policy profiles. You can configure separate CoS policy profiles for home, roaming, and visitor subscriber traffic.

   NOTE: You can configure multiple classifier profiles and CoS policy profiles to address QoS configuration requirements for home, roaming, and visitor subscriber traffic.

8. Apply a local policy at the gateway level or APN level.
9. Configure ingress and egress rewrite rules for upstream and downstream subscriber traffic.
10. Apply ingress and egress rewrite rules on mobile interfaces to provide Differentiated Services code point (DSCP) marking for upstream and downstream subscriber traffic.

**Related Documentation**

- Call Admission Control Overview on page 324
- Class of Service (CoS) Policy Profile Overview on page 327
- Policing Subscriber Traffic on the Broadband Gateway Overview on page 328
- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Configuring the Maximum Number of Bearers

You configure the maximum bearers to specify an upper limit on the number of bearers allowed at the system level or access point name (APN) level.

When the total number of active bearers at the gateway level or APN level reaches the maximum configured limit, the MobileNext Broadband Gateway rejects new bearer requests.

- Configure the maximum number of active bearers allowed at the gateway level.

  [edit unified-edge gateways ggsn-pgw *MBG1*]
  user@host# **set maximum-bearers** ***5000000***

- For each APN, configure the maximum number of active bearers allowed at the APN level.

  [edit unified-edge gateways ggsn-pgw *MBG1* apn-services apns *apn-1*]
  user@host# **set maximum-bearers *10000***

**Related Documentation**

- Configuring QoS on the Broadband Gateway Overview on page 333
- Call Admission Control Overview on page 324
- Class of Service (CoS) Policy Profile Overview on page 327
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Configuring Bandwidth Pools

You configure a bandwidth pool to ensure that sufficient bandwidth is available when guaranteed bit rate (GBR) packet data protocol (PDP) contexts are created or modified. Call admission control (CAC) uses bandwidth pools to either accept or reject the GBR PDP contexts based on availability of bandwidth, or to negotiate and reserve the bandwidth.

To configure a bandwidth pool:

1. Specify a name for the bandwidth pool.

   [edit unified-edge cos-cac]
   user@host# **edit gbr-bandwidth-pools *bw-pool-1***

2. Configure the total bandwidth of the pool, in megabits per second (Mbps).

   [edit unified-edge cos-cac gbr-bandwidth-pools *bw-pool-1*]
   user@host# **set maximum-bandwidth *500000***

3. (Optional) Specify that when the bearer load on the broadband gateway reaches the configured bandwidth threshold, then create or modify PDP context requests can be downgraded, starting with lower priority requests.

   [edit unified-edge cos-cac gbr-bandwidth-pools *bw-pool-1* ]
   user@host# **set downgrade-gtp-v1-gbr-bearers**

NOTE: If the **downgrade-gtp-v1-gbr-bearers** option is configured and the bandwidth threshold is reached, create or modify PDP context requests arriving on the broadband gateway are downgraded to the Background traffic class. If the **downgrade-gtp-v1-gbr-bearers** option is not configured and the bandwidth threshold is reached, create or modify PDP context requests arriving on the broadband gateway are rejected.

**Related Documentation**

- Configuring QoS on the Broadband Gateway Overview on page 333

## Configuring Preemption for Call Admission Control

You can enable preemption at the gateway level to enable the preemption capability indicator (PCI) and preemption vulnerability indicator (PVI) flags. Preemption is disabled by default. In a 4G network, the PVI and PCI bit values are included with the allocation and retention priority (ARP). In a 3G network, PDP context requests do not support the PVI and PCI flags, and the MobileNext Broadband Gateway uses ARP values to determine preemption capability and preemption vulnerability. GTPv1 subscribers. Preemption takes effect when the high threshold for bearer or memory load (configured in a **resource-threshold-profile**) is reached on the MobileNext Broadband Gateway.

To enable preemption on the broadband gateway:

- To enable preemption for both GTPv1 and GTPv2 subscribers:

  ```
  [edit unified-edge gateways ggsn-pgw MBG1 preemption]
  user@host# set enable
  ```

- To enable only PVI for GTPv1 subscribers:

  ```
  [edit unified-edge gateways ggsn-pgw MBG1 preemption]
  user@host# set enable
  user@host# set gtpv1-pci-disable
  ```

- To enable only PCI for GTPv1 subscribers:

  ```
  [edit unified-edge gateways ggsn-pgw MBG1 preemption]
  user@host# set enable
  user@host# set gtpv1-pvi-disable
  ```

**Related Documentation**

- Configuring QoS on the Broadband Gateway Overview on page 333
- Call Admission Control Overview on page 324
- Class of Service (CoS) Policy Profile Overview on page 327
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Configuring Resource Thresholds for 3G and 4G Networks

You configure a resource threshold profile to ensure that when the bearer load, CPU load, or memory load at the access point name (APN) or gateway level on the MobileNext Broadband Gateway reaches a specified threshold, only create session requests that meet or exceed a designated allocation and retention priority (ARP) level are admitted.

Table 51 on page 337 shows the mapping of EPS bearer ARP to Release 99 bearer parameter ARP.

**Table 51: Mapping of EPS Bearer ARP to Release 99 Bearer Parameter ARP**

| EPS Bearer Priority Level | Release 99 Bearer Parameter ARP |
|---|---|
| 1 | 1 |
| 6 | 2 |
| 11 | 3 |

To configure a resource threshold profile:

1. Specify a name for the resource threshold.

   ```
   [edit unified-edge cos-cac]
   user@host# edit resource-threshold-profiles resource-threshold-1
   ```

2. Configure the bearer priority level and threshold limits for the number of bearers:

   a. Configure the bearer priority when the number of bearers reaches the lower threshold. The following configuration specifies that when the number of bearers exceeds 70 percent of the allowed limit, only Create Session requests with a priority level equal to or higher than the specified ARP value are accepted:

      ```
      [edit unified-edge cos-cac resource-threshold-profiles resource-threshold-1
        bearers-load low]
      user@host# set percentage 70
      user@host# priority-level 10
      ```

   b. Configure the bearer priority when the number of bearers reaches the upper threshold. The following configuration specifies that when the number of bearers exceeds 85 percent, only Create Session requests with a priority level equal to or higher than the specified ARP values are accepted:

      ```
      [edit unified-edge cos-cac resource-threshold-profiles resource-threshold-1
        bearers-load high]
      user@host# set percentage 85
      user@host# set priority-level 4
      ```

3. Configure the bearer priority and threshold limits for the CPU load:

   a. Configure a lower limit for the CPU load.

      ```
      [edit unified-edge cos-cac resource-threshold-profiles resource-threshold-1 cpu
        low]
      ```

```
user@host# set percentage 70
user@host# set priority-level 10
```

b. Configure an upper limit for the CPU load.

```
[edit unified-edge cos-cac resource-threshold-profiles resource-threshold-1 cpu
  high]
user@host# set percentage 85
user@host# set priority-level 4
```

4. Configure the bearer priority and threshold limits for the memory load:

a. Configure a lower limit for the memory load.

```
[edit unified-edge cos-cac resource-threshold-profiles resource-threshold-1 memory
  low]
user@host# set percentage 70
user@host# set priority-level 10
```

b. Configure an upper limit for the memory load.

```
[edit unified-edge cos-cac resource-threshold-profiles resource-threshold-1 memory
  high]
user@host# set percentage 85
user@host# set priority-level 10
```

**Related Documentation**

- Configuring QoS on the Broadband Gateway Overview on page 333
- Call Admission Control Overview on page 324
- Example: Configuring Quality of Service on GGSN/P-GW on page 359
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Configuring a Classifier Profile for 3G and 4G Networks

A classifier profile defines the quality of service (QoS) classification for a MobileNext Broadband Gateway configured as a Gateway GPRS Support Node/Packet Data Network Gateway (GGSN/P-GW). You can configure a QoS class identifier (QCI) value and associated forwarding class and loss priority to define the packet-forwarding treatment for both 3G and 4G bearers. Each QCI is associated with priority, delay, and packet loss values.

NOTE: The broadband gateway maps Release 99 QoS parameter values to standardized QCI values as defined in GTTP Specification 23.401 ANNEX E.

To configure a classifier profile to map each QCI value to a forwarding class and packet loss priority:

1. Specify a name for the classifier profile.

```
[edit unified-edge cos-cac]
```

```
user@host# edit classifier-profiles classifier-profile-1
```

2. Configure a packet-forwarding treatment that maps to the conversational traffic class.

```
[edit unified-edge cos-cac classifier-profiles classifier-profile-1]
user@host# set qos-class-identifier 2  forwarding-class af3 loss-priority low
```

3. Configure a packet-forwarding treatment that maps to the streaming traffic class.

```
[edit unified-edge cos-cac classifier-profiles classifier-profile-1]
user@host# set qos-class-identifier 4 forwarding-class af2 loss-priority low
```

4. Configure a packet-forwarding treatment for IP Multimedia Subsystem (IMS) signaling traffic that also maps to the Interactive traffic class with Traffic Handling Priority (THP) 1.

```
[edit unified-edge cos-cac classifier-profiles classifier-profile-1]
user@host# set qos-class-identifier 5 forwarding-class af2 loss-priority low
```

5. Configure a packet forwarding treatment for video (buffered streaming) traffic that also maps to the Interactive traffic class with THP 2.

```
[edit unified-edge cos-cac classifier-profiles classifier-profile-1]
user@host# set qos-class-identifier 6 forwarding-class af2 loss-priority low
```

6. Configure a packet forwarding treatment for voice, video (live streaming), and interactive gaming traffic that also maps to the Interactive traffic class with THP 2.

```
[edit unified-edge cos-cac classifier-profiles classifier-profile-1]
user@host# set qos-class-identifier 7 forwarding-class af3 loss-priority low
```

7. Configure a packet forwarding treatment for background traffic that also maps to the Interactive traffic class with THP 3.

```
[edit unified-edge cos-cac classifier-profiles classifier-profile-1]
user@host# set qos-class-identifier 8 forwarding-class be loss-priority low
```

**Related Documentation**

- Configuring QoS on the Broadband Gateway Overview on page 333
- Example: Configuring Quality of Service on GGSN/P-GW on page 359
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Configuring a CoS Policy Profile for 4G Networks

In a 4G network, a class-of-service (CoS) policy profile defines the highest QoS Class Identifier (QCI) value that can be accepted at the access point name (APN) level or gateway level, the aggregate maximum bit rate (AMBR) for default bearers, and the allocation and retention priority (ARP). By default, when a bearer request has a higher AMBR value than the value configured in the CoS policy profile, the AMBR value of the bearer request is downgraded. A CoS policy profile also specifies the policer action to take when subscriber traffic exceeds the policer rates.

Before you begin, complete the following tasks:

- Configure a CoS classifier profile.
- Configure a CoS resource threshold profile.

To configure a CoS policy profile for a 4G network:

1. Specify a name for the CoS policy profile.

   ```
   [edit unified-edge cos-cac]
   user@host# edit cos-policy-profiles policy-profile-2
   ```

2. Negotiate the QCI value for 4G subscribers by doing one of the following:

   - Downgrade the QCI value of create session requests that come in with a higher QCI value (numerically lower) than the configured value:

     [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2*]
     user@host# **set default-bearer-qci** *6*

     NOTE: When the default (downgrade) behavior is configured, if a create session request comes in with higher QCI value (numerically lower) than the value configured on the broadband gateway, the QCI value is downgraded to the configured value. If a create session request comes in with a lower QCI value (numerically higher) than the configured QCI, the QCI value is accepted as is.

   - Upgrade the QCI value of create session requests that come in with a lower QCI value (numerically higher) than the configured value:

     [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2*]
     user@host# **set default-bearer-qci** *6* **upgrade**

     NOTE: When the **upgrade** option is configured, if a create session request comes in with higher QCI value (numerically lower) than the value configured on the broadband gateway, the QCI value is downgraded to the configured value. If a create session request comes in with a lower QCI value (numerically higher) than the configured QCI, the QCI value is upgraded to the configured value.

   - Reject the QCI value of create session requests that come in with a higher QCI value (numerically lower) than the configured value:

     [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2*]
     user@host# **set default-bearer-qci** *6* **reject**

     NOTE: When the **reject** option is configured, if a create session request comes in with higher QCI value (numerically lower) than the value configured on the broadband gateway, the create session request is rejected. If a create session request comes in with a lower QCI value (numerically higher) than the configured QCI, the QCI value is accepted as is.

   NOTE: If the QCI value is not specified, the broadband gateway uses the UE/SGW requested or negotiated QCI value.

3. Negotiate the ARP value for 4G subscribers when a bearer is established or modified:

- Specify that bearers that come in with a lower ARP (numerically higher) than the configured value are accepted, and bearers with a higher ARP (numerically lower) are downgraded to the configured value (the default behavior):

  [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2*]
  user@host# **set allocation-retention-priority *7***

- Specify that bearers that come in with a lower ARP (numerically higher) than the configured value are accepted, and bearers with a higher ARP (numerically lower) are rejected:

  [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2*]
  user@host# **set allocation-retention-priority *7* reject**

NOTE: If the allocation-retention-priority value is not specified, the broadband gateway uses the UE/SGW requested or negotiated ARP value.

4. Negotiate uplink and downlink AMBR for 4G subscribers by doing one of the following:

   - Specify that bearer requests with an AMBR value higher than the configured value are downgraded to the configured AMBR value, and bearer requests with a lower value than the configured AMBR value are accepted (the default behavior):

     [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2* aggregate-qos-control]
     user@host# **set maximum-bit-rate-uplink *15000***
     user@host# **set maximum-bit-rate-downlink *25000***

   - Specify that bearer requests with a lower AMBR value than the configured value are upgraded to the configured AMBR value, and bearer requests with a higher AMBR value than the configured value are downgraded:

     [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2* aggregate-qos-control]
     user@host# **set maximum-bit-rate-uplink *15000* upgrade**
     user@host# **set maximum-bit-rate-downlink *25000* upgrade**

   - Specify that bearer requests with a higher AMBR value than the configured value are rejected, and bearer requests with a lower AMBR value than the configured value are accepted:

     [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2* aggregate-qos-control]
     user@host# **set maximum-bit-rate-uplink *15000* reject**
     user@host# **set maximum-bit-rate-downlink *25000* reject**

5. Configure the policer action to define how default bearer data is treated when it exceeds the AMBR value with which the default bearer was established.

   [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2* policer-action non-gbr-bearer]
   user@host# **set violate-action *set-loss-priority-high***

   When **violate-action** is configured with **set-loss-priority-high**, data that exceeds the AMBR is transmitted with PLP high.

NOTE: By default, bearers that exceed the AMBR are dropped.

**Related Documentation**

- Class of Service (CoS) Policy Profile Overview on page 327
- Configuring QoS on the Broadband Gateway Overview on page 333
- Configuring a CoS Policy Profile for 3G Networks on page 343
- Configuring a CoS Policy Profile for 3G and 4G Networks on page 348
- Example: Configuring Quality of Service on GGSN/P-GW on page 359
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Configuring a CoS Policy Profile for 3G Networks

In a 3G network, the class-of-service (CoS) policy profile defines the highest non-GBR traffic class mapped to a QoS class identifier (QCI) that can be accepted at an access point name (APN) or gateway level, the maximum bit rate (MBR), the guaranteed bit rate (GBR) for each traffic class, and the allocation and retention priority (ARP). A CoS policy profile also specifies the policer action to take when subscriber traffic exceeds the configured GBR, MBR, or both. By default, when a PDP context request has a higher MBR or GBR value than the value configured in the CoS policy profile, the packet data protocol (PDP) context request is downgraded.

Before you begin, complete the following tasks:

- Configure a CoS resource threshold profile.
- Configure CoS bandwidth pools.
- Configure a CoS classifier profile.

To configure a CoS policy profile for a 3G network:

1. Specify a name for the CoS policy profile.

   ```
   [edit unified-edge cos-cac]
   user@host# edit cos-policy-profiles policy-profile-2
   ```

2. Negotiate the non-GBR traffic class for 3G subscribers by doing one of the following:

   - Downgrade the traffic class of create PDP context requests that come in with a higher traffic class than the configured value:

     [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2*]
     user@host# **set default-bearer-qci *6***

     NOTE: When default (downgrade) behavior is configured, if a create PDP context request comes in with higher traffic class (mapped to QCI) than the value configured on the broadband gateway, the traffic class is downgraded to the configured value. If a create PDP context request comes in with a lower traffic class (numerically higher QCI) than the configured traffic class, then the traffic class is accepted.

   - Upgrade the traffic class of create PDP context requests that come in with a lower traffic class (numerically higher QCI) than the configured value:

     [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2*]
     user@host# **set default-bearer-qci *6* upgrade**

     NOTE: when upgrade option is configured, if a create PDP context request comes in with higher traffic class (numerically lower QCI) than the value configured on the broadband gateway, the QCI value is downgraded to the configured value. If a create session request comes in with a lower QCI value (numerically higher) than the configured QCI, then the QCI value is upgraded to the configured value.

   - Reject the traffic class of create PDP context requests that come in with a higher traffic class (numerically lower QCI) than the configured value:

     [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2*]
     user@host# **set default-bearer-qci *6* reject**

     NOTE: When reject option is configured, if a create PDP context comes in with higher traffic class (numerically lower QCI) than the value configured on the broadband gateway, the create PDP context is rejected. If a create PDP context comes in with a lower traffic class (numerically higher QCI) than the configured QCI, then the traffic class is accepted as is.

   NOTE: If the QCI/traffic class value is not specified, the broadband gateway uses the UE/SGSN requested or negotiated traffic class value.

3. Negotiate the ARP value for 3G a when a PDP context is established or modified:

- Specify that PDP contexts that come in with a lower ARP (numerically higher) than the configured value are accepted, and PDP contexts with a higher ARP (numerically lower) are downgraded to the configured value (the default behavior):

  [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2*]
  user@host# **set allocation-retention-priority *7***

- Specify that PDP contexts that come in with a lower ARP (numerically higher) than the configured value are accepted, and that PDP contexts with a higher ARP (numerically lower) are rejected:

  [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2*]
  user@host# **set allocation-retention-priority *7* reject**

NOTE: For GTPv1 subscriber traffic received on the broadband gateway, ARP 1 maps to allocation-retention-priority 1, ARP 2 maps to allocation-retention-priority 6, and ARP 3 maps to allocation-retention-priority 11.

NOTE: If the allocation-retention-priority value is not specified, the broadband gateway uses the UE/SGSN requested or negotiated ARP value.

4. Negotiate uplink and downlink MBR for 3G non-GBR PDP contexts by doing one of the following:

   - Specify that PDP context requests that come in with an MBR value higher than the configured value are downgraded to the configured MBR value, and PDP context requests that come in with a lower value than the configured MBR value are accepted (the default behavior):

     [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2* pdp-qos-control]
     user@host# **set maximum-bit-rate-uplink *15000***
     user@host# **set maximum-bit-rate-downlink *25000***

   - Specify that PDP context requests that come in with a lower MBR value than the configured value are upgraded to the configured MBR value, and PDP context requests that come in with a higher MBR value than the configured value are downgraded:

     [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2* pdp-qos-control]
     user@host# **set maximum-bit-rate-uplink *15000* upgrade**
     user@host# **set maximum-bit-rate-downlink *25000* upgrade**

   - Specify that PDP context requests that come in with a higher MBR value than the configured value are rejected, and PDP context requests that come in with a lower MBR value than the configured value are accepted:

     [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2* pdp-qos-control]
     user@host# **set maximum-bit-rate-uplink *15000* reject**

```
user@host# set maximum-bit-rate-downlink 25000 reject
```

5. Negotiate the uplink and downlink GBR for 3G GBR bearers by doing one of the following:

   - Specify that PDP context requests that come in with a GBR value higher than the configured value are downgraded to the configured GBR value, and PDP context requests that come in with a lower value than the configured GBR value are accepted (the default behavior):

     ```
     [edit unified-edge cos-cac cos-policy-profiles policy-profile-2 pdp-qos-control]
     user@host# set guaranteed-bit-rate-uplink 15000
     user@host# set guaranteed-bit-rate-downlink 25000
     ```

   - Specify that PDP context requests that come in with a lower GBR value than the configured value are upgraded to the configured GBR value, and PDP context requests that come in with a higher GBR value than the configured value are downgraded:

     ```
     [edit unified-edge cos-cac cos-policy-profiles policy-profile-2 pdp-qos-control]
     user@host# set guaranteed-bit-rate-uplink 15000 upgrade
     user@host# set guaranteed-bit-rate-downlink 25000 upgrade
     ```

   - Specify that PDP context requests that come in with a higher GBR value than the configured values are rejected, and PDP context requests that come in with a lower GBR value than the configured value are accepted:

     ```
     [edit unified-edge cos-cac cos-policy-profiles policy-profile-2 pdp-qos-control]
     user@host# set guaranteed-bit-rate-uplink 15000 reject
     user@host# set guaranteed-bit-rate-downlink 25000 reject
     ```

6. Negotiate the uplink and downlink MBR for non-GBR PDP contexts by configuring each traffic class using the default, upgrade, or reject option.

   NOTE: The following traffic classes are configured using the default (downgrade) behavior, which specifies that PDP context requests that come in with a lower MBR value than the configured value are upgraded to the configured MBR value, and PDP context requests that come in with a higher MBR value than the configured value are downgraded.

   a. Configure an MBR for the Interactive traffic class with Traffic Handling Priority (THP) 1 and signaling indication enabled:

      ```
      [edit unified-edge cos-cac cos-policy-profiles policy-profile-2 pdp-qos-control]
      user@host# set qci 5 maximum-bit-rate-uplink 10000
      user@host# set qci 5 maximum-bit-rate-downlink 20000
      ```

   b. Configure an MBR for the Interactive traffic class with THP 1:

      ```
      [edit unified-edge cos-cac cos-policy-profiles policy-profile-2 pdp-qos-control]
      user@host# set qci 6 maximum-bit-rate-uplink 10000
      user@host# set qci 6 maximum-bit-rate-downlink 20000
      ```

   c. Configure an MBR for Interactive traffic class with THP 2:

```
[edit unified-edge cos-cac cos-policy-profiles policy-profile-2 pdp-qos-control]
user@host# set qci 7 maximum-bit-rate-uplink 10000
user@host# set qci 7 maximum-bit-rate-downlink 20000
```

d. Configure an MBR for Interactive traffic class with THP 3:

```
[edit unified-edge cos-cac cos-policy-profiles policy-profile-2 pdp-qos-control]
user@host# set qci 8 maximum-bit-rate-uplink 10000
user@host# set qci 8 maximum-bit-rate-downlink 20000
```

e. Configure an MBR for the Background traffic class:

```
[edit unified-edge cos-cac cos-policy-profiles policy-profile-2 pdp-qos-control]
user@host# set qci 9 maximum-bit-rate-uplink 10000
user@host# set qci 9 maximum-bit-rate-downlink 10000
```

7. Configure the policer action to define how non-GBR bearer data should be treated when it exceeds the MBR value with which the PDP context was established.

```
[edit unified-edge cos-cac cos-policy-profiles policy-profile-2 policer-action
  non-gbr-bearer]
user@host# set violate-action set-loss-priority-high
```

When **violate-action** is configured with **set-loss-priority-high**, data that exceeds the MBR is transmitted with PLP high.

NOTE: By default, GTPv1 subscribers that exceed the MBR are dropped.

8. Configure the action to take when the GBR exceeds the GBR value with which the PDP context was established.

```
[edit unified-edge cos-cac cos-policy-profiles policy-profile-2 policer-action gbr-bearer]
user@host# set exceed-action transmit
```

NOTE: By default, PDP contexts that exceed the GBR are set to PLP HIGH. When **exceed action** is configured with **transmit**, PDP contexts exceeding that GBR are transmitted with same PLP as PDP contexts within the GBR.

**Related Documentation**

- Class of Service (CoS) Policy Profile Overview on page 327
- Configuring QoS on the Broadband Gateway Overview on page 333
- Configuring a CoS Policy Profile for 4G Networks on page 340
- Configuring a CoS Policy Profile for 3G and 4G Networks on page 348
- Example: Configuring Quality of Service on GGSN/P-GW on page 359
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Configuring a CoS Policy Profile for 3G and 4G Networks

In a 3G network, the class-of-service (CoS) policy profile defines the highest traffic class (mapped to QoS Class Identifier (QCI)) that can be accepted at an access point name (APN) or gateway level, the maximum bit rate (MBR) and guaranteed bit rate (GBR) for packet data protocol (PDP) contexts, and the allocation and retention priority (ARP). The CoS policy also specifies the policer actions when subscriber traffic exceeds the configured MBR and GBR values. By default, when a PDP context request has a higher MBR or GBR value than the value configured in the CoS policy profile, the MBR or GBR value of the PDP context request is downgraded.

NOTE: For GTPv1 subscribers, the MobileNext Broadband Gateway converts the traffic class to a QCI (as defined in the 3GPP specification 23.401 ANNEX E) and applies the COS policy based on the configured QCI values.

In a 4G network, a CoS policy profile defines the highest QCI value that can be accepted at the APN level or gateway level, the aggregate maximum bit rate (AMBR) for default bearers, and the allocation and retention priority. By default, when a bearer request has a higher AMBR value than the value configured in the CoS policy profile, the AMBR value of bearer request is downgraded.

Before you begin, complete the following tasks:

- Configure a CoS classifier profile for 3G and 4G networks.
- Configure CoS bandwidth pools (for 3G networks only).
- Configure a CoS resource threshold profile for 3G and 4G networks.

To configure a CoS policy profile for 3G and 4G networks:

1. Specify a name for the CoS policy profile.

   ```
   [edit unified-edge cos-cac]
   user@host# edit cos-policy-profiles policy-profile-2
   ```

2. Negotiate the QCI value for 4G subscribers and the traffic class for 3G subscribers by doing one of the following:

   - Downgrade the QCI value of create session requests that come in with a higher QCI value (numerically lower) than the configured value:

     [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2*]
     user@host# **set default-bearer-qci *6***

     NOTE: When the default (downgrade) behavior is configured, if a create session request comes in with higher QCI value (numerically lower) than the value configured on the broadband gateway, the QCI value is downgraded to the configured value. If a create session request comes in with a lower QCI value (numerically higher) than the configured QCI, the QCI value is accepted.

   - Upgrade the QCI value of create session requests that come in with a lower QCI value (numerically higher) than the configured value:

     [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2*]
     user@host# **set default-bearer-qci *6* upgrade**

     NOTE: When the upgrade option is configured, if a create session request comes in with higher QCI value (numerically lower) than the value configured on the broadband gateway, the QCI value is downgraded to the configured value. If a create session request comes in with a lower QCI value (numerically higher) than the configured QCI, the QCI value is upgraded to the configured value.

   - Reject the QCI value of create session requests that come in with a higher QCI value (numerically lower) than the configured value:

     [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2*]
     user@host# **set default-bearer-qci *6* reject**

     NOTE: When the reject option is configured, if a create session request comes in with higher QCI value (numerically lower) than the value configured on the broadband gateway, the QCI value is rejected. If a create session request comes in with a lower QCI value (numerically higher) than the configured QCI, the QCI value is accepted as is.

3. Negotiate the ARP value for 3G and 4G subscribers when a PDP context or bearer is established or modified:

   - Specify that bearers that come in with a lower ARP (numerically higher) than the configured value are accepted and bearers with a higher ARP (numerically lower) are downgraded to the configured value (default behavior):

     [edit unified-edge cos-cac cos-policy-profiles *policy-profile-2*]

```
user@host# set allocation-retention-priority 7
```

- Specify that bearers that come in with a lower ARP (numerically higher) than the configured value are accepted, and bearers with a higher ARP (numerically lower) are rejected:

```
[edit unified-edge cos-cac cos-policy-profiles policy-profile-2]
user@host# set allocation-retention-priority 7 reject
```

NOTE: For GTPv1 subscriber traffic received on the broadband gateway, ARP 1 maps to allocation-retention-priority 1, ARP 2 maps to allocation-retention-priority 6, and ARP 3 maps to allocation-retention-priority 11.

NOTE: If the allocation-retention-priority value is not specified, the broadband gateway uses the UE/SGSN requested or negotiated ARP value.

4. Negotiate uplink and downlink AMBR for 4G subscribers by doing one of the following:

   - Specify that bearer requests with an AMBR value higher than the configured value are downgraded to the configured AMBR value, and bearer requests with a lower value than the configured AMBR value are accepted (the default behavior):

```
[edit unified-edge cos-cac cos-policy-profiles policy-profile-2 aggregate-qos-control]
user@host# set maximum-bit-rate-uplink 15000
user@host# set maximum-bit-rate-downlink 25000
```

   - Specify that bearer requests with a lower AMBR value than the configured value are upgraded to the configured AMBR value, and bearer requests with a higher AMBR value than the configured value are downgraded:

```
[edit unified-edge cos-cac cos-policy-profiles policy-profile-2 aggregate-qos-control]
user@host# set maximum-bit-rate-uplink 15000 upgrade
user@host# set maximum-bit-rate-downlink 25000 upgrade
```

   - Specify that bearer requests with a higher AMBR value than the configured value are rejected, and bearer requests with a lower AMBR value than the configured value are accepted:

```
[edit unified-edge cos-cac cos-policy-profiles policy-profile-2 aggregate-qos-control]
user@host# set maximum-bit-rate-uplink 15000 reject
user@host# set maximum-bit-rate-downlink 25000 reject
```

NOTE: If the AMBR value is not specified, the broadband gateway uses the UE/MME requested or negotiated AMBR value.

5. Negotiate uplink and downlink MBR for 3G non-GBR PDP contexts by doing one of the following:

   - Specify that PDP context requests that come in with an MBR value higher than the configured value are downgraded to the configured MBR value, and PDP context requests that come in with a lower value than the configured MBR value are accepted (the default behavior):

     **[edit unified-edge cos-cac cos-policy-profiles *policy-profile-2* pdp-qos-control]**
     **user@host# set maximum-bit-rate-uplink *15000***
     **user@host# set maximum-bit-rate-downlink *25000***

   - Specify that PDP context requests that come in with a lower MBR value than the configured value are upgraded to the configured MBR value, and PDP context requests that come in with a higher MBR values than the configured value are downgraded:

     **[edit unified-edge cos-cac cos-policy-profiles *policy-profile-2* pdp-qos-control]**
     **user@host# set maximum-bit-rate-uplink *15000* upgrade**
     **user@host# set maximum-bit-rate-downlink *25000* upgrade**

   - Specify that PDP context requests that come in with a higher MBR value than the configured value are rejected, and PDP context requests that come in with a lower MBR value than the configured value are accepted:

     **[edit unified-edge cos-cac cos-policy-profiles *policy-profile-2* pdp-qos-control]**
     **user@host# set maximum-bit-rate-uplink *15000* reject**

```
user@host# set maximum-bit-rate-downlink 25000 reject
```

6. Negotiate the uplink and downlink GBR for 3G GBR bearers by doing one of the following:

   - Specify that PDP context requests that come in with a GBR value higher than the configured value are downgraded to the configured GBR value, and PDP context requests that come in with a lower value than the configured GBR value are accepted (the default behavior):

     ```
     [edit unified-edge cos-cac cos-policy-profiles policy-profile-2 pdp-qos-control]
     user@host# set guaranteed-bit-rate-uplink 15000
     user@host# set guaranteed-bit-rate-downlink 25000
     ```

   - Specify that PDP context requests that come in with a lower GBR value than the configured value are upgraded to the configured GBR value, and PDP context requests that come in with a higher GBR value than the configured value are downgraded:

     ```
     [edit unified-edge cos-cac cos-policy-profiles policy-profile-2 pdp-qos-control]
     user@host# set guaranteed-bit-rate-uplink 15000 upgrade
     user@host# set guaranteed-bit-rate-downlink 25000 upgrade
     ```

   - Specify that PDP context requests that come in with a higher GBR value than the configured values are rejected, and PDP context requests that come in with a lower GBR value than the configured value are accepted:

     ```
     [edit unified-edge cos-cac cos-policy-profiles policy-profile-2 pdp-qos-control]
     user@host# set guaranteed-bit-rate-uplink 15000 reject
     user@host# set guaranteed-bit-rate-downlink 25000 reject
     ```

7. Negotiate the uplink and downlink MBR for non-GBR PDP contexts, you configure each traffic class using either the default, upgrade, or reject behavior.

   NOTE: The following traffic classes are configured using the default (downgrade) behavior. PDP context requests that come in with a lower MBR value than the configured value are upgraded to the configured MBR value, and PDP context requests that come in with a higher MBR value than the configured value are downgraded.

   a. Configure an MBR for the Interactive traffic class with Traffic Handling Priority (THP) 1 and signaling indication enabled:

      ```
      [edit unified-edge cos-cac cos-policy-profiles policy-profile-2 pdp-qos-control]
      user@host# set qci 5 maximum-bit-rate-uplink 10000
      user@host# set qci 5 maximum-bit-rate-downlink 20000
      ```

   b. Configure an MBR for the Interactive traffic class with THP 1:

      ```
      [edit unified-edge cos-cac cos-policy-profiles policy-profile-2 pdp-qos-control]
      user@host# set qci 6 maximum-bit-rate-uplink 10000
      user@host# set qci 6 maximum-bit-rate-downlink 20000
      ```

   c. Configure an MBR for Interactive traffic class with THP 2:

```
[edit unified-edge cos-cac cos-policy-profiles policy-profile-2 pdp-qos-control]
user@host# set qci 7 maximum-bit-rate-uplink 10000
user@host# set qci 7 maximum-bit-rate-downlink 20000
```

d. Configure an MBR for Interactive traffic class with THP 3:

```
[edit unified-edge cos-cac cos-policy-profiles policy-profile-2 pdp-qos-control]
user@host# set qci 8 maximum-bit-rate-uplink 10000
user@host# set qci 8 maximum-bit-rate-downlink 20000
```

e. Configure an MBR for the Background traffic class:

```
[edit unified-edge cos-cac cos-policy-profiles policy-profile-2 pdp-qos-control]
user@host# set qci 9 maximum-bit-rate-uplink 10000
user@host# set qci 9 maximum-bit-rate-downlink 10000
```

8. Configure the policer action to define how non-GBR bearer data is treated when it exceeds the MBR value with which the PDP context was established or the AMBR value with which the default bearer was established.

```
[edit unified-edge cos-cac cos-policy-profiles policy-profile-2 policer-action
  non-gbr-bearer]
user@host# set violate-action set-loss-priority-high
```

When **violate-action** is configured with **set-loss-priority-high**, data that exceeds the MBR is transmitted with PLP high.

NOTE: By default, GTPv1 subscribers that exceed the MBR and GTPv2 subscribers that exceed the AMBR are dropped.

9. Configure the policer actions to take to define how GBR bearer data is treated:

a. Configure the policer action to define how GBR bearer data is treated when the MBR exceeds the MBR value with which the PDP context was established.

```
[edit unified-edge cos-cac cos-policy-profiles policy-profile-2 policer-action
  non-gbr-bearer]
user@host# set violate-action set-loss-priority-high
```

b. Configure the policer actions to take to define how GBR bearer data is treated when the GBR exceeds the GBR value with which the PDP context was established.

```
[edit unified-edge cos-cac cos-policy-profiles policy-profile-2 policer-action
  gbr-bearer]
user@host# set exceed-action transmit
```

NOTE: By default, PDP contexts that exceed the GBR are set to PLP HIGH. When **exceed action** is configured with **transmit**, PDP contexts exceeding the GBR are transmitted with the same PLP as PDP contexts within the GBR.

**Related Documentation**

- Class of Service (CoS) Policy Profile Overview on page 327

- Configuring QoS on the Broadband Gateway Overview on page 333
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397


## Configuring a Local Policy

A local policy defines the quality-of-service (QoS) treatment to be applied at the system level or access point name (APN) level for the MobileNext Broadband Gateway. A local policy applied at the APN level takes priority over a local policy applied at the system level. A local policy defines traffic by classes and specifies the different levels of throughput and packet loss when congestion occurs.

Before you begin, configure each of the following QoS features:

- Bandwidth pool—Limits the GBR bandwidth usage at the system level or APN level. The broadband gateway's call admission control (CAC) uses bandwidth pools to negotiate and reserve bandwidth.
- Resource threshold profiles—Limit CPU and memory load. When the number of bearers or system load (memory, CPU, and queue depth) reaches a configured low or high threshold, only higher-priority bearer requests are allowed.
- Classifier profiles—Define the mapping of traffic classes (a traffic class or QoS Class Identifier [QCI]) to a forwarding class and packet loss priority (PLP). You configure separate classifier profiles for home, roaming, and visitor subscriber traffic.
- CoS policy profiles—Configure separate class-of-service (CoS) profiles for home, roaming, and visitor subscriber traffic.

To configure a local policy:

1. Specify a name for the local policy.

   ```
   [edit unified-edge]
   user@host# edit local-policies local-policy-2
   ```

2. Specify the classifier profiles to include in the local policy to define the mapping of each traffic class to a forwarding class and PLP.

   ```
   [edit unified-edge local-policies local-policy-2]
   user@host# set classifier-profile home-classifier-profile-1
   user@host# set roamer-classifier-profile roaming-classifier-profile-1
   user@host# set visitor-classifier-profile visiting-classifier-profile-1
   ```

3. Specify the CoS policy profiles to include in the local policy to define the QoS parameters for bearer setup and teardown.

   ```
   [edit unified-edge local-policies local-policy-2]
   user@host# set policy-profile home-policy-profile-1
   user@host# set roamer-policy-profile roaming-policy-profile-1
   user@host# set visitor-policy-profile visiting-policy-profile-1
   ```

4. Specify the resource threshold profile to include in the local policy to define admission control for managing system overload conditions.

```
[edit unified-edge local-policies local-policy-2]
user@host# set resource-threshold-profiles resource-threshold--profile-1
```

5. Specify a bandwidth pool for downlink traffic.

```
[edit unified-edge local-policies local-policy-2]
user@host# set dl-bandwidth-pool bw-pool-downlink-1
```

6. Specify a bandwidth pool for uplink traffic.

```
[edit unified-edge local-policies local-policy-2]
user@host# set ul-bandwidth-pool bw-pool-uplink-1
```

**Related Documentation**

- Configuring QoS on the Broadband Gateway Overview on page 333
- Configuring the Maximum Number of Bearers on page 334
- Configuring Bandwidth Pools on page 335
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Applying a Local Policy

A local policy defines the QoS treatment to be applied at the system level or access point name (APN) level for a MobileNext Broadband Gateway. A local policy applied at the APN level takes priority over a local policy applied at the system level.

Before you begin, you must configure a local policy to define the QoS treatment to be applied at the system level or APN level for a broadband gateway.

- To apply a local policy at the system level:

```
[edit gateways ggsn-pgw MBG1]
user@host# edit local-policy-profile local-policy1
```

- To apply a local policy at the access point name (APN) level:

```
[edit gateways ggsn-pgw MBG1 apn-services apns apn1]
user@host# edit local-policy-profile local-policy2
```

**Related Documentation**

- Configuring a Local Policy on page 354
- Configuring the Maximum Number of Bearers on page 334
- Configuring Bandwidth Pools on page 335
- Configuring QoS on the Broadband Gateway Overview on page 333
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Configuring Ingress Rewrite Rules for a Mobile Interface

You configure egress rewrite rules and then apply those rules to change DiffServ code point (DSCP) bits or IP precedence bits for subscriber packets received on a mobile interface.

To create an ingress rewrite rule for a mobile interface:

1. Specify a name for the ingress rewrite rules.

   ```
   [edit class-of-service rewrite-rules]
   user@host# edit dscp dscp_v4_ingress_rw
   ```

2. Configure a rewrite rules mapping on DSCP, DSCP IPv6, or IP precedence values; for example:

   ```
   [edit class-of-service rewrite-rules dscp dscp_v4_ingress_rw]
   user@host# set forwarding class af1 loss-priority high code-point 001110
   user@host# set forwarding class af1 loss-priority low code-point 001010
   user@host# set forwarding class af2 loss-priority high code-point 010110
   user@host# set forwarding class af2 loss-priority low code-point 010010
   user@host# set forwarding class af3 loss-priority high code-point 011110
   user@host# set forwarding class af3 loss-priority low code-point 011010
   user@host# set forwarding class af4 loss-priority high code-point 100110
   user@host# set forwarding class af4 loss-priority low code-point 100010
   user@host# set forwarding class be loss-priority low code-point 000000
   ```

**Related Documentation**

- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- Configuring Egress Rewrite Rules for a Mobile Interface on page 356
- Configuring QoS on the Broadband Gateway Overview on page 333
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Configuring Egress Rewrite Rules for a Mobile Interface

You configure egress rewrite rules and then apply those rules to change DiffServ code point (DSCP) bits or IP precedence bits for subscriber packets received on a mobile interface.

To create an egress rewrite rule for a mobile interface:

1. Specify a name for the egress rewrite rules.

   ```
   [edit class-of-service rewrite-rules]
   user@host# edit dscp dscp_v4_egress_rw
   ```

2. Configure a rewrite rules mapping on DSCP, DSCP IPv6, or IP precedence values; for example:

   ```
   [edit class-of-service rewrite-rules dscp dscp_v4_egress_rw]
   user@host# set forwarding class af1 loss-priority high code-point 001110
   ```

```
user@host# set forwarding class af1 loss-priority low code-point 001010
user@host# set forwarding class af2 loss-priority high code-point 010110
user@host# set forwarding class af2 loss-priority low code-point 010010
user@host# set forwarding class af3 loss-priority high code-point 011110
user@host# set forwarding class af3 loss-priority low code-point 011010
user@host# set forwarding class af4 loss-priority high code-point 100110
user@host# set forwarding class af4 loss-priority low code-point 100010
user@host# set forwarding class be loss-priority low code-point 000000
```

**Related Documentation**

- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- Configuring QoS on the Broadband Gateway Overview on page 333
- Configuring Ingress Rewrite Rules for a Mobile Interface on page 356
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Applying Ingress Rewrite Rules to a Mobile Interface

You apply ingress rewrite rules to change the DiffServ code point (DSCP), DSCPv6, or IP precedence value in the IP header of the upstream subscriber packets. You can specify rewrite rules for DSCPv4, DSCPv6, or IP precedence values.

The rewrite rule is applied for Gn-to-Gi traffic at the mobile interface and rewrites into the outer IP header of the subscriber packet only.

NOTE: DSCP marking on the subscriber packet is required for mobile traffic. If ingress rewrite rules are not configured and applied to the mif interface, the default mcos-dscp-default or mcos-dscpv6-default rewrite rules apply.

Before you begin, complete the following tasks:

- Configure an ingress rewrite rule.
- Configure the mobile interfaces.

To apply a rewrite rule to the outer IP header, specify the name of the rewrite rule that you want to apply to the mobile interface; for example:

```
[edit class-of-service interfaces mif unit 0 ingress-rewrite-rules]
user@host# set dscp uplink_rewrite_v4_dscp
```

**Related Documentation**

- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- Configuring QoS on the Broadband Gateway Overview on page 333
- Applying Egress Rewrite Rules to Mobile Interfaces on page 358
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Applying Egress Rewrite Rules to Mobile Interfaces

You apply egress rewrite rules to change the DiffServ code point (DSCP), DSCPv6, or IP precedence value in the IP header of downstream subscriber packets. You can specify rewrite rules for DSCPv4, DSCPv6, or IP precedence values.

An egress rewrite rule for downstream (Gi-to-Gn or SGi-to-S5) traffic is applied at the mobile interface and rewrites into the inner IP header, and optionally, outer IP header, or both inner and outer IP headers.

NOTE: **DSCP marking on the subscriber packet is required for mobile traffic. If egress rewrite rules are not configured and applied to the mobile interfaces, the default mcos-dscp-default or mcos-dscpv6-default rewrite rules apply.**

Before you begin, complete the following tasks:

- Configure the mobile interfaces.
- Configure an egress rewrite rule.

To apply an egress rewrite rule to change DSCP, DSCPv6, or IP precedence values in the IP header of downstream subscriber packets:

- To apply a DSCP (IPv4) rewrite rule to the inner IP header, specify the name of the rewrite rule you want to apply to the mobile interface.

  **[edit class-of-service interfaces mif unit 0 rewrite-rules]**
  **user@host# set dscp *downlink_rewrite_v4_dscp_inner***

- To apply a rewrite rule on the outer IP header, specify the name of the rewrite rule you want to apply to the mobile interface and include the **gtp-inet-outer** option.

  **[edit class-of-service interfaces mif unit 0 rewrite-rules]**
  **user@host# set dscp *downlink_rewrite_v4_dscp_outer* protocol gtp-inet-outer**

- To apply a DSCP rewrite rule to both the inner and outer IP headers, specify the name of the rewrite rule you want to apply to the mobile interface and include the **gtp-inet-both** option.

  **[edit class-of-service interfaces mif unit 0 rewrite-rules]**
  **user@host# set dscp *downlink_rewrite_v4_dscp* protocol gtp-inet-both**

**Related Documentation**

- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- Configuring QoS on the Broadband Gateway Overview on page 333
- Applying Ingress Rewrite Rules to a Mobile Interface on page 357

## Example: Configuring Quality of Service on GGSN/P-GW

This example describes how to configure quality of service (QoS) on the MobileNext Broadband Gateway, and consists of the following sections:



### Requirements

This example uses the following hardware and software components:

- An operational MX Series chassis
- Junos OS MobileNext Broadband Gateway software package

Before you begin:

- Configure mobile interfaces for access point names (APNs)
- Configure APNs on the broadband gateway
- Configure Junos OS class-of-service (CoS) forwarding classes

## Overview

In a mobile network, the availability of network resources is shared among multiple services (including Internet, voice, video, e-mail, and file sharing), each of which has different QoS requirements in terms of required bit rates, acceptable packet loss rates, and packet delay. You configure QoS on the broadband gateway to prioritize subscriber traffic and provide better service to certain services or subscribers to the detriment of other services and subscribers.

To configure QoS on the broadband gateway, you create a set of QoS profiles that are then referenced in a local policy, which defines the QoS treatment for 3G 4G subscriber traffic on the broadband gateway. You configure the following profiles and policies:

- Classifier profiles—Define the mapping of each traffic class and QoS Class Identifier (QCI) to a forwarding class and packet loss priority. You configure a separate classifier profiles for home, visiting, and roaming subscribers on 3G and 4G networks. Each classifier profile uses a GTPv2 QCI to define forwarding treatment for 3G and 4G subscribers. For 3G subscribers, the broadband gateway maps the GTPv1 traffic class or traffic handling priorities to the equivalent GTPv2 QCI and applies the classification. For example, a GTPv1 subscriber that arrives on the gateway with Interactive traffic class and THP 1 and signaling indication enabled maps to QCI 5, and data for this subscriber is classified based on the QCI 5 forwarding treatment you configure in the classifier profile. For information about mapping of QCI values to Release 99 QoS parameter values, see the "Quality of Service Overview" on page 318.
- Resource threshold profiles—Define the thresholds for number of bearers, memory, and CPU load. Call admission control (CAC) is based on the configured resource thresholds and allows only higher priority traffic when low or high resource thresholds are exceeded. You can configure a single resource threshold profile at the gateway level for 3G and 4G subscribers.
- CoS policy profiles—Define the negotiation of QoS parameters to determine when bearer requests can be upgraded, downgraded, or rejected. You define CoS policy profiles to provide separate QoS configurations for home, visiting, and roaming subscribers on 3G and 4G networks.
- Bandwidth pools—Define bandwidth pools to limit guaranteed bit rate (GBR) utilization (3G networks).
- Local policies—Define the overall CoS and call admission control behavior for 3G and 4G subscriber traffic. A local policy is applied at either the gateway or access point name (APN) level. A local policy applied at the APN level takes priority over a local policy applied at the gateway. Each local policy includes the classifier profiles, resource threshold profiles, and CoS policy profiles that define the overall QoS treatment for 3G subscriber traffic, 4G subscriber traffic, or both. A local policy can include multiple classifier profiles, resource threshold profiles, and CoS policy profiles to provide QoS treatment specific to the home, visiting, and roaming subscribers on 3G and 4G networks.
- Rewrite rules—Provide the required DiffServ code point (DSCP) marking of subscriber packets for uplink and downlink traffic.

## Configuration

To configure QoS on the broadband gateway, perform the following tasks:



### Configuring Classifier Profiles for Home Subscribers on 3G and 4G Networks

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge cos-cac classifier-profiles home_pgw qos-class-identifier 2
   forwarding-class af1 loss-priority low
set unified-edge cos-cac classifier-profiles home_pgw qos-class-identifier 4
   forwarding-class af2 loss-priority low
```

```
set unified-edge cos-cac classifier-profiles home_pgw qos-class-identifier 5
  forwarding-class af1 loss-priority low
set unified-edge cos-cac classifier-profiles home_pgw qos-class-identifier 6
  forwarding-class af2 loss-priority low
set unified-edge cos-cac classifier-profiles home_pgw qos-class-identifier 7
  forwarding-class af3 loss-priority low
set unified-edge cos-cac classifier-profiles home_pgw qos-class-identifier 8
  forwarding-class af4 loss-priority low
set unified-edge cos-cac classifier-profiles home_pgw qos-class-identifier 9
  forwarding-class af4 loss-priority low
```

**Step-by-Step Procedure**

To configure a classifier profile for home subscribers on 3G and 4G Networks:

1. Specify a name for the home classifier profile and map each 3G traffic class and 4G QoS Class Identifier to a forwarding class and packet loss priority.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles home_pgw
  qos-class-identifier 2 forwarding-class af1 loss-priority low
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles home_pgw
  qos-class-identifier 4 forwarding-class af2 loss-priority low
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles home_pgw
  qos-class-identifier 5 forwarding-class af1 loss-priority low
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles home_pgw
  qos-class-identifier 6 forwarding-class af2 loss-priority low
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles home_pgw
  qos-class-identifier 7 forwarding-class af3 loss-priority low
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles home_pgw
  qos-class-identifier 8 forwarding-class af4 loss-priority low
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles home_pgw
  qos-class-identifier 9 forwarding-class af4 loss-priority low
```

**Results**

From configuration mode, confirm your configuration by entering the **show** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

If you are done configuring the device, enter **commit** from configuration mode.

### Configuring Classifier Profiles for Roaming Subscribers on 3G and 4G Networks

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge cos-cac classifier-profiles roamer_pgw qos-class-identifier 2
  forwarding-class af1 loss-priority high
set unified-edge cos-cac classifier-profiles roamer_pgw qos-class-identifier 4
  forwarding-class af2 loss-priority high
set unified-edge cos-cac classifier-profiles roamer_pgw qos-class-identifier 5
  forwarding-class af3 loss-priority low
set unified-edge cos-cac classifier-profiles roamer_pgw qos-class-identifier 6
  forwarding-class af4 loss-priority low
set unified-edge cos-cac classifier-profiles roamer_pgw qos-class-identifier 7
  forwarding-class af4 loss-priority low
```

```
set unified-edge cos-cac classifier-profiles roamer_pgw qos-class-identifier 8
   forwarding-class ef loss-priority high
set unified-edge cos-cac classifier-profiles roamer_pgw qos-class-identifier 9
   forwarding-class be loss-priority high
```

**Step-by-Step Procedure**

To configure classifier profiles for roaming subscribers on 3G and 4G networks:

1. Specify a name for the roamer classifier profile and map each 3G traffic class and 4G Qos Class Identifier to a forwarding class and packet loss priority.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles roamer_pgw
   qos-class-identifier 2 forwarding-class af1 loss-priority high
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles roamer_pgw
   qos-class-identifier 4 forwarding-class af2 loss-priority high
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles roamer_pgw
   qos-class-identifier 5 forwarding-class af3 loss-priority low
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles roamer_pgw
   qos-class-identifier 6 forwarding-class af4 loss-priority low
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles roamer_pgw
   qos-class-identifier 7 forwarding-class af4 loss-priority low
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles roamer_pgw
   qos-class-identifier 8 forwarding-class ef loss-priority high
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles roamer_pgw
   qos-class-identifier 9 forwarding-class be loss-priority high
```

### Configuring Classifier Profiles for Visitor Subscribers on 3G and 4G Networks

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge cos-cac classifier-profiles visitor_pgw qos-class-identifier 2
   forwarding-class af1 loss-priority high
set unified-edge cos-cac classifier-profiles visitor_pgw qos-class-identifier 4
   forwarding-class af2 loss-priority high
set unified-edge cos-cac classifier-profiles visitor_pgw qos-class-identifier 5
   forwarding-class af4 loss-priority high
set unified-edge cos-cac classifier-profiles visitor_pgw qos-class-identifier 6
   forwarding-class af4 loss-priority high
set unified-edge cos-cac classifier-profiles visitor_pgw qos-class-identifier 7
   forwarding-class ef loss-priority high
set unified-edge cos-cac classifier-profiles visitor_pgw qos-class-identifier 8
   forwarding-class be loss-priority high
set unified-edge cos-cac classifier-profiles visitor_pgw qos-class-identifier 9
   forwarding-class nc loss-priority high
```

**Step-by-Step Procedure**

To configure classifier profiles for visitor subscribers on 3G and 4G networks:

1. Specify a name for the visitor classifier profile and map each 3G traffic class and 4G QoS Class Identifier to a forwarding class and packet loss priority.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles visitor_pgw
   qos-class-identifier 2 forwarding-class af1 loss-priority high
```

```
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles visitor_pgw
  qos-class-identifier 4 forwarding-class af2 loss-priority high
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles visitor_pgw
  qos-class-identifier 5 forwarding-class af4 loss-priority high
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles visitor_pgw
  qos-class-identifier 6 forwarding-class af4 loss-priority high
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles visitor_pgw
  qos-class-identifier 7 forwarding-class ef loss-priority high
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles visitor_pgw
  qos-class-identifier 8 forwarding-class be loss-priority high
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles visitor_pgw
  qos-class-identifier 9 forwarding-class nc loss-priority high
```

### Configuring a System-Wide Classifier Profile

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge cos-cac classifier-profiles system_wide qos-class-identifier 2
  forwarding-class af2 loss-priority low
set unified-edge cos-cac classifier-profiles system_wide qos-class-identifier 4
  forwarding-class af3 loss-priority low
set unified-edge cos-cac classifier-profiles system_wide qos-class-identifier 5
  forwarding-class af4 loss-priority low
set unified-edge cos-cac classifier-profiles system_wide qos-class-identifier 6
  forwarding-class af4 loss-priority high
set unified-edge cos-cac classifier-profiles system_wide qos-class-identifier 7
  forwarding-class nc loss-priority high
set unified-edge cos-cac classifier-profiles system_wide qos-class-identifier 8
  forwarding-class ef loss-priority high
set unified-edge cos-cac classifier-profiles system_wide qos-class-identifier 9
  forwarding-class be loss-priority high
```

**Step-by-Step Procedure**

To configure the system-wide classifier profile for 3G and 4G networks:

1. Specify a name (**system_wide**) for the classifier profile and map each 3G traffic class and 4G QoS Class Identifier to a forwarding class and packet loss priority.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles system_wide
  qos-class-identifier 2 forwarding-class af2 loss-priority low
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles system_wide
  qos-class-identifier 4 forwarding-class af3 loss-priority low
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles system_wide
  qos-class-identifier 5 forwarding-class af4 loss-priority low
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles system_wide
  qos-class-identifier 6 forwarding-class af4 loss-priority high
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles system_wide
  qos-class-identifier 7 forwarding-class nc loss-priority high
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles system_wide
  qos-class-identifier 8 forwarding-class ef loss-priority high
user@ggsn-pgw# set unified-edge cos-cac classifier-profiles system_wide
  qos-class-identifier 9 forwarding-class be loss-priority high
```

**Results** From configuration mode, confirm your configuration by entering the **show** command at the various hierarchy levels. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

If you are done configuring the device, enter **commit** from configuration mode.

### Configuring a System-Wide Resource Threshold Profile

**CLI Quick Configuration** To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge cos-cac resource-threshold-profiles resource_pgw bearers-load low
  percentage 60
set unified-edge cos-cac resource-threshold-profiles resource_pgw bearers-load low
  priority-level 7
set unified-edge cos-cac resource-threshold-profiles resource_pgw bearers-load high
  percentage 80
set unified-edge cos-cac resource-threshold-profiles resource_pgw bearers-load high
  priority-level 4
set unified-edge cos-cac resource-threshold-profiles resource_pgw cpu low percentage
  70
set unified-edge cos-cac resource-threshold-profiles resource_pgw cpu low priority-level
  7
set unified-edge cos-cac resource-threshold-profiles resource_pgw cpu high percentage
  80
set unified-edge cos-cac resource-threshold-profiles resource_pgw cpu high priority-level
  4
set unified-edge cos-cac resource-threshold-profiles resource_pgw memory low percentage
  85
set unified-edge cos-cac resource-threshold-profiles resource_pgw memory low
  priority-level 10
set unified-edge cos-cac resource-threshold-profiles resource_pgw memory high percentage
  90
set unified-edge cos-cac resource-threshold-profiles resource_pgw memory high
  priority-level 5
```

**Step-by-Step Procedure** To configure resource threshold profiles for subscribers on 3G and 4G networks:

1. Configure the low and high thresholds for bearer load.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac resource-threshold-profiles resource_pgw
  bearers-load low percentage 60
user@ggsn-pgw# set unified-edge cos-cac resource-threshold-profiles resource_pgw
  bearers-load low priority-level 7
user@ggsn-pgw# set unified-edge cos-cac resource-threshold-profiles resource_pgw
  bearers-load high percentage 80
user@ggsn-pgw# set unified-edge cos-cac resource-threshold-profiles resource_pgw
  bearers-load high priority-level 4
```

2. Configure the low and high thresholds for the CPU load.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac resource-threshold-profiles resource_pgw
  cpu low percentage 70
```

```
user@ggsn-pgw# set unified-edge cos-cac resource-threshold-profiles resource_pgw
  cpu low priority-level 7
user@ggsn-pgw# set unified-edge cos-cac resource-threshold-profiles resource_pgw
  cpu high percentage 80
user@ggsn-pgw# set unified-edge cos-cac resource-threshold-profiles resource_pgw
  cpu high priority-level 4
```

3. Configure the low and high thresholds for the memory load.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac resource-threshold-profiles resource_pgw
  memory low percentage 85
user@ggsn-pgw# set unified-edge cos-cac resource-threshold-profiles resource_pgw
  memory low priority-level 10
user@ggsn-pgw# set unified-edge cos-cac resource-threshold-profiles resource_pgw
  memory high percentage 90
user@ggsn-pgw# set unified-edge cos-cac resource-threshold-profiles resource_pgw
  memory high priority-level 5
```

**Results** From configuration mode, confirm your configuration by entering the **show** command at the various hierarchy levels. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

If you are done configuring the device, enter **commit** from configuration mode.

## Configuring a CoS Policy Profile for Home Subscribers on a 3G Network

**CLI Quick Configuration** To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge cos-cac cos-policy-profiles home_v1 default-bearer-qci 6 upgrade
set unified-edge cos-cac cos-policy-profiles home_v1 allocation-retention-priority 5
set unified-edge cos-cac cos-policy-profiles home_v1 pdp-qos-control
  maximum-bit-rate-uplink 3072 upgrade
set unified-edge cos-cac cos-policy-profiles home_v1 pdp-qos-control
  maximum-bit-rate-downlink 3072 upgrade
set unified-edge cos-cac cos-policy-profiles home_v1 pdp-qos-control
  guaranteed-bit-rate-uplink 3008 upgrade
set unified-edge cos-cac cos-policy-profiles home_v1 pdp-qos-control
  guaranteed-bit-rate-downlink 3008 upgrade
set unified-edge cos-cac cos-policy-profiles home_v1 pdp-qos-control qci 6
  maximum-bit-rate-uplink 896
set unified-edge cos-cac cos-policy-profiles home_v1 pdp-qos-control qci 6
  maximum-bit-rate-downlink 896
set unified-edge cos-cac cos-policy-profiles home_v1 pdp-qos-control qci 7
  maximum-bit-rate-uplink 896
set unified-edge cos-cac cos-policy-profiles home_v1 pdp-qos-control qci 7
  maximum-bit-rate-downlink 896
set unified-edge cos-cac cos-policy-profiles home_v1 pdp-qos-control qci 8
  maximum-bit-rate-uplink 896
set unified-edge cos-cac cos-policy-profiles home_v1 pdp-qos-control qci 8
  maximum-bit-rate-downlink 896
set unified-edge cos-cac cos-policy-profiles home_v1 pdp-qos-control qci 9
  maximum-bit-rate-uplink 896
```

```
set unified-edge cos-cac cos-policy-profiles home_v1 pdp-qos-control qci 9
  maximum-bit-rate-downlink 896
set unified-edge cos-cac cos-policy-profiles home_v1 policer-action non-gbr-bearer
  violate-action transmit
set unified-edge cos-cac cos-policy-profiles home_v1 policer-action gbr-bearer
  exceed-action transmit
set unified-edge cos-cac cos-policy-profiles home_v1 policer-action gbr-bearer
  violate-action transmit
```

**Step-by-Step Procedure**

To configure a CoS policy profile for home subscribers in a 3G network:

1. Specify a name for the CoS policy profile, negotiate the non-GBR traffic class for 3G subscribers, and specify the **upgrade** option to upgrade the traffic class (mapped to QCI value) of create PDP context requests that come in with a lower traffic class than the configured value and downgrade requests with a higher traffic class (numerically lower QCI value):

   ```
   [edit]
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v1
     default-bearer-qci 6 upgrade
   ```

2. Specify that PDP context requests that come in with a lower ARP (numerically higher) than the configured value are accepted and PDP context requests with a higher ARP (numerically lower) are downgraded to the configured value (default behavior).

   ```
   [edit]
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v1
     allocation-retention-priority 5
   ```

   NOTE: For GTPv1 subscriber traffic received on the broadband gateway, ARP 1 maps to allocation-retention-priority 1, ARP 2 maps to allocation-retention-priority 6, and ARP 3 maps to allocation-retention-priority 11.

   NOTE: If the allocation-retention-priority value is not specified, the broadband gateway uses the UE/SGSN requested or negotiated ARP value.

3. Specify that GBR PDP context requests that come in with a lower MBR value than the configured value are upgraded to the configured MBR value, and PDP context requests that come in with a higher MBR values than the configured value are downgraded to the configured MBR value.

   ```
   [edit]
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v1
     pdp-qos-control maximum-bit-rate-uplink 3072 upgrade
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v1
     pdp-qos-control maximum-bit-rate-downlink 3072 upgrade
   ```

4. Specify that GBR PDP context requests that come in with a lower GBR value than the configured value are upgraded to the configured GBR value, and PDP context requests that come in with a higher GBR value than the configured value are downgraded to the configured GBR value.

```
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v1
  pdp-qos-control guaranteed-bit-rate-uplink 3008 upgrade
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v1
  pdp-qos-control guaranteed-bit-rate-downlink 3008 upgrade
```

5. Configure the uplink and downlink maximum bit rates for the non-GBR traffic classes:

   a. Configure an MBR for the Interactive traffic class with THP 1 (without signaling indication):

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v1
  pdp-qos-control qci 6 maximum-bit-rate-uplink 896
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v1
  pdp-qos-control qci 6 maximum-bit-rate-downlink 896
```

   b. Configure an MBR for the Interactive traffic class with THP 2:

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v1
  pdp-qos-control qci 7 maximum-bit-rate-uplink 896
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v1
  pdp-qos-control qci 7 maximum-bit-rate-downlink 896
```

   c. Configure an MBR for the Interactive traffic class with THP 3:

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v1
  pdp-qos-control qci 8 maximum-bit-rate-uplink 896
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v1
  pdp-qos-control qci 8 maximum-bit-rate-downlink 896
```

   d. Configure an MBR for the Background traffic class:

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v1
  pdp-qos-control qci 9 maximum-bit-rate-uplink 896
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v1
  pdp-qos-control qci 9 maximum-bit-rate-downlink 896
```

6. Configure the action to take for non-GBR PDP context requests when the MBR exceeds the configured value.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v1 policer-action
  non-gbr-bearer violate-action transmit
```

7. Configure the action to take for GBR PDP context requests when the GBR exceeds the configured value.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v1 policer-action
  gbr-bearer exceed-action transmit
```

8. Configure the action to take for GBR PDP context requests when the MBR exceeds the configured value.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v1 policer-action
  gbr-bearer violate-action transmit
```

**Results** From configuration mode, confirm your configuration by entering the **show** command at the various hierarchy levels. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

If you are done configuring the device, enter **commit** from configuration mode.

## Configuring a CoS Policy Profile for Home Subscribers on a 4G Network

**CLI Quick Configuration** To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge cos-cac cos-policy-profiles home_v2 default-bearer-qci 6 upgrade
set unified-edge cos-cac cos-policy-profiles home_v2 allocation-retention-priority 5 upgrade
set unified-edge cos-cac cos-policy-profiles home_v2 aggregate-qos-control
  maximum-bit-rate-uplink 2048
set unified-edge cos-cac cos-policy-profiles home_v2 aggregate-qos-control
  maximum-bit-rate-downlink 2048
set unified-edge cos-cac cos-policy-profiles home_v2 policer-action non-gbr-bearer
  violate-action transmit
```

**Step-by-Step Procedure** To configure a CoS policy profile for home subscribers in a 4G network:

1. Specify a name for the CoS policy profile, negotiate the QoS Class Identifier (QCI) for 4G subscribers, and specify the **upgrade** option to upgrade the QCI value of bearer requests that come in with a lower QCI (numerically higher) than the configured value and downgrade requests with a higher QCI.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v2
  default-bearer-qci 6 upgrade
```

2. Specify that bearers that come in with a lower ARP (numerically higher) than the configured value are accepted and bearers with a higher ARP (numerically lower) are downgraded to the configured value (default behavior).

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v2
  allocation-retention-priority 5
```

NOTE: If the allocation-retention-priority value is not specified, the broadband gateway uses the UE/SGW requested or negotiated ARP value.

3. Specify that bearers that come in with a lower MBR value than the configured value are upgraded to the configured MBR value, and bearers that come in with a higher MBR values than the configured value are downgraded to the configured MBR value.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v2
  aggregate-qos-control maximum-bit-rate-uplink 2048
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v2
  aggregate-qos-control maximum-bit-rate-downlink 2048
```

4. Configure the action to take for bearers when the AMBR exceeds the configured value.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles home_v2
  policer-action non-gbr-bearer violate-action transmit
```

**Results** From configuration mode, confirm your configuration by entering the **show** command at the various hierarchy levels. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

If you are done configuring the device, enter **commit** from configuration mode.

## Configuring a CoS Policy Profile for Roaming Subscribers on a 3G Network

**CLI Quick Configuration** To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge cos-cac cos-policy-profiles roamer_v1 default-bearer-qci 6
set unified-edge cos-cac cos-policy-profiles roamer_v1 allocation-retention-priority 6
set unified-edge cos-cac cos-policy-profiles roamer_v1 pdp-qos-control
  maximum-bit-rate-uplink 2500
set unified-edge cos-cac cos-policy-profiles roamer_v1 pdp-qos-control
  maximum-bit-rate-downlink 2500
set unified-edge cos-cac cos-policy-profiles roamer_v1 pdp-qos-control
  guaranteed-bit-rate-uplink 2372
set unified-edge cos-cac cos-policy-profiles roamer_v1 pdp-qos-control
  guaranteed-bit-rate-downlink 2372
set unified-edge cos-cac cos-policy-profiles roamer_v1 pdp-qos-control qci 6
  maximum-bit-rate-uplink 896
set unified-edge cos-cac cos-policy-profiles roamer_v1 pdp-qos-control qci 6
  maximum-bit-rate-downlink 896
set unified-edge cos-cac cos-policy-profiles roamer_v1 pdp-qos-control qci 7
  maximum-bit-rate-uplink 896
set unified-edge cos-cac cos-policy-profiles roamer_v1 pdp-qos-control qci 7
  maximum-bit-rate-downlink 896
set unified-edge cos-cac cos-policy-profiles roamer_v1 pdp-qos-control qci 8
  maximum-bit-rate-uplink 896
set unified-edge cos-cac cos-policy-profiles roamer_v1 pdp-qos-control qci 8
  maximum-bit-rate-downlink 896
set unified-edge cos-cac cos-policy-profiles roamer_v1 pdp-qos-control qci 9
  maximum-bit-rate-uplink 896
set unified-edge cos-cac cos-policy-profiles roamer_v1 pdp-qos-control qci 9
  maximum-bit-rate-downlink 896
```

```
set unified-edge cos-cac cos-policy-profiles roamer_v1 policer-action non-gbr-bearer
  violate-action transmit
set unified-edge cos-cac cos-policy-profiles roamer_v1 policer-action gbr-bearer
  exceed-action transmit
set unified-edge cos-cac cos-policy-profiles roamer_v1 policer-action gbr-bearer
  violate-action transmit
```

**Step-by-Step Procedure**

To configure a CoS policy profile for roaming subscribers in a 3G network:

1. Specify a name for the CoS policy profile, negotiate the non-GBR traffic class for 3G subscribers, and specify the default to upgrade the traffic class (mapped to QCI value) of create PDP context requests that come in with a lower traffic class than the configured value and downgrade requests with a higher traffic class (numerically lower QCI value).

   ```
   [edit]
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v1
     default-bearer-qci 6
   ```

2. Specify that PDP context requests that come in with a lower ARP (numerically higher) than the configured value are accepted and PDP context requests with a higher ARP (numerically lower) are downgraded to the configured value (default behavior).

   ```
   [edit]
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v1
     allocation-retention-priority 5
   ```

   NOTE: For GTPv1 subscriber traffic received on the broadband gateway, ARP 1 maps to allocation-retention-priority 1, ARP 2 maps to allocation-retention-priority 6, and ARP 3 maps to allocation-retention-priority 11.

   NOTE: If the allocation-retention-priority value is not specified, the broadband gateway uses the UE/SGSN requested or negotiated ARP value.

3. Specify that GBR PDP context requests that come in with a lower MBR value than the configured value are accepted, and PDP context requests that come in with a higher MBR values than the configured value are downgraded to the configured MBR value.

   ```
   [edit]
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v1
     pdp-qos-control maximum-bit-rate-uplink 2500
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v1
     pdp-qos-control maximum-bit-rate-downlink 2500
   ```

4. Specify that GBR PDP context requests that come in with a lower GBR value than the configured value are accepted, and PDP context requests that come in with a higher GBR value than the configured value are downgraded to the configured GBR value.

```
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v1
  pdp-qos-control guaranteed-bit-rate-uplink 2372
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v1
  pdp-qos-control guaranteed-bit-rate-downlink 2372
```

5. Configure the uplink and downlink maximum bit rates for traffic classes for non-GBR PDP contexts:

   a. Configure an MBR for the Interactive traffic class with THP 1 (without signaling indication).

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v1
  pdp-qos-control qci 6 maximum-bit-rate-uplink 896
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v1
  pdp-qos-control qci 6 maximum-bit-rate-downlink 896
```

   b. Configure an MBR for the Interactive traffic class with THP 2.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v1
  pdp-qos-control qci 7 maximum-bit-rate-uplink 896
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v1
  pdp-qos-control qci 7 maximum-bit-rate-downlink 896
```

   c. Configure an MBR for the Interactive traffic class with THP 3.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v1
  pdp-qos-control qci 8 maximum-bit-rate-uplink 896
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v1
  pdp-qos-control qci 8 maximum-bit-rate-downlink 896
```

   d. Configure an MBR for the Background traffic class.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v1
  pdp-qos-control qci 9 maximum-bit-rate-uplink 896
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v1
  pdp-qos-control qci 9 maximum-bit-rate-downlink 896
```

6. Configure the action to take for non-GBR PDP context requests when the MBR exceeds the configured value.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v1
  policer-action non-gbr-bearer violate-action transmit
```

7. Configure the action to take for GBR PDP context requests when the GBR exceeds the configured value.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v1
  policer-action gbr-bearer exceed-action transmit
```

8. Configure the action to take for GBR PDP context requests when the MBR exceeds the configured value.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v1
  policer-action gbr-bearer violate-action transmit
```

**Results** From configuration mode, confirm your configuration by entering the **show** command at the various hierarchy levels. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

If you are done configuring the device, enter **commit** from configuration mode.

## Configuring a CoS Policy Profile for Roaming Subscribers on a 4G Network

**CLI Quick Configuration** To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge cos-cac cos-policy-profiles roamer_v2 default-bearer-qci 6
set unified-edge cos-cac cos-policy-profiles roamer_v2 allocation-retention-priority 5
set unified-edge cos-cac cos-policy-profiles roamer_v2 aggregate-qos-control
  maximum-bit-rate-uplink 1600
set unified-edge cos-cac cos-policy-profiles roamer_v2 aggregate-qos-control
  maximum-bit-rate-downlink 1600
set unified-edge cos-cac cos-policy-profiles roamer_v2 policer-action non-gbr-bearer
  violate-action transmit
```

**Step-by-Step Procedure** To configure a CoS policy profile for roaming subscribers in a 4G network:

1. Specify a name for the CoS policy profile, negotiate the QoS Class Identifier (QCI) for 4G subscribers, and accept bearer requests that come in with a lower QCI (numerically higher) than the configured value and downgrade requests that come in with a higher QCI.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v2
  default-bearer-qci 6
```

2. Specify that bearers that come in with a lower ARP (numerically higher) than the configured value are accepted and bearers with a higher ARP (numerically lower) are downgraded to the configured value (default behavior).

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v2
  allocation-retention-priority 5
```

NOTE: If the allocation-retention-priority value is not specified, the broadband gateway uses the UE/SGW requested or negotiated ARP value.

3. Specify that bearers that come in with a lower MBR value than the configured value accepted, and bearers that come in with a higher MBR values than the configured value are downgraded to the configured MBR value.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v2
  aggregate-qos-control maximum-bit-rate-uplink 1600
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v2
  aggregate-qos-control maximum-bit-rate-downlink 1600
```

4. Configure the action to take for bearers when the AMBR exceeds the configured value.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles roamer_v2
  policer-action non-gbr-bearer violate-action transmit
```

**Results** From configuration mode, confirm your configuration by entering the **show** command at the various hierarchy levels. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

If you are done configuring the device, enter **commit** from configuration mode.

## Configuring a CoS Policy Profile for Visiting Subscribers on a 3G Network

**CLI Quick Configuration** To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge cos-cac cos-policy-profiles visitor_v1 default-bearer-qci 7
set unified-edge cos-cac cos-policy-profiles visitor_v1 allocation-retention-priority 9
set unified-edge cos-cac cos-policy-profiles visitor_v1 pdp-qos-control
  maximum-bit-rate-uplink 2048 upgrade
set unified-edge cos-cac cos-policy-profiles visitor_v1 pdp-qos-control
  maximum-bit-rate-downlink 2048 upgrade
set unified-edge cos-cac cos-policy-profiles visitor_v1 pdp-qos-control
  guaranteed-bit-rate-uplink 1984 upgrade
set unified-edge cos-cac cos-policy-profiles visitor_v1 pdp-qos-control
  guaranteed-bit-rate-downlink 1984 upgrade
set unified-edge cos-cac cos-policy-profiles visitor_v1 pdp-qos-control qci 6
  maximum-bit-rate-uplink 896
set unified-edge cos-cac cos-policy-profiles visitor_v1 pdp-qos-control qci 6
  maximum-bit-rate-downlink 896
set unified-edge cos-cac cos-policy-profiles visitor_v1 pdp-qos-control qci 7
  maximum-bit-rate-uplink 896
set unified-edge cos-cac cos-policy-profiles visitor_v1 pdp-qos-control qci 7
  maximum-bit-rate-downlink 896
set unified-edge cos-cac cos-policy-profiles visitor_v1 pdp-qos-control qci 8
  maximum-bit-rate-uplink 896
set unified-edge cos-cac cos-policy-profiles visitor_v1 pdp-qos-control qci 8
  maximum-bit-rate-downlink 896
set unified-edge cos-cac cos-policy-profiles visitor_v1 pdp-qos-control qci 9
  maximum-bit-rate-uplink 896
set unified-edge cos-cac cos-policy-profiles visitor_v1 pdp-qos-control qci 9
  maximum-bit-rate-downlink 896
```

```
set unified-edge cos-cac cos-policy-profiles visitor_v1 policer-action non-gbr-bearer
  violate-action transmit
set unified-edge cos-cac cos-policy-profiles visitor_v1 policer-action gbr-bearer
  exceed-action transmit
set unified-edge cos-cac cos-policy-profiles visitor_v1 policer-action gbr-bearer
  violate-action transmit
```

**Step-by-Step Procedure**

To configure a CoS policy profile for visitor subscribers in a 3G network:

1. Specify a name for the CoS policy profile, negotiate the non-GBR traffic class for 3G subscribers, and specify the default to upgrade the traffic class (mapped to QCI value) of create PDP context requests that come in with a lower traffic class than the configured value and downgrade requests with a higher traffic class (numerically lower QCI value).

   ```
   [edit]
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v1
     default-bearer-qci 7
   ```

2. Specify that PDP context requests that come in with a lower ARP (numerically higher) than the configured value are accepted, and PDP context requests with a higher ARP (numerically lower) are downgraded to the configured value (default behavior).

   ```
   [edit]
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v1
     allocation-retention-priority 9
   ```

   NOTE: For GTPv1 subscriber traffic received on the broadband gateway, ARP 1 maps to allocation-retention-priority 1, ARP 2 maps to allocation-retention-priority 6, and ARP 3 maps to allocation-retention-priority 11.

   NOTE: If the allocation-retention-priority value is not specified, the broadband gateway uses the UE/SGSN requested or negotiated ARP value.

3. Specify that GBR PDP context requests that come in with a lower MBR value than the configured value are upgraded to the configured MBR value, and PDP context requests that come in with a higher MBR values than the configured value are downgraded to the configured MBR value.

   ```
   [edit]
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v1
     pdp-qos-control maximum-bit-rate-uplink 2048 upgrade
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v1
     pdp-qos-control maximum-bit-rate-downlink 2048 upgrade
   ```

4. Specify that GBR PDP context requests that come in with a lower GBR value than the configured value are upgraded to the configured GBR value, and PDP context requests that come in with a higher GBR value than the configured value are downgraded to the configured GBR value.

```
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v1
  pdp-qos-control guaranteed-bit-rate-uplink 1984 upgrade
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v1
  pdp-qos-control guaranteed-bit-rate-downlink 1984 upgrade
```

5. Configure the uplink and downlink maximum bit rates for traffic classes for non-GBR PDP contexts:

   a. Configure an MBR for the Interactive traffic class with THP 1 (without signaling indication).

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v1
  pdp-qos-control qci 6 maximum-bit-rate-uplink 896
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v1
  pdp-qos-control qci 6 maximum-bit-rate-downlink 896
```

   b. Configure an MBR for the Interactive traffic class with THP 2.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v1
  pdp-qos-control qci 7 maximum-bit-rate-uplink 896
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v1
  pdp-qos-control qci 7 maximum-bit-rate-downlink 896
```

   c. Configure an MBR for the Interactive traffic class with THP 3.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v1
  pdp-qos-control qci 8 maximum-bit-rate-uplink 896
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v1
  pdp-qos-control qci 8 maximum-bit-rate-downlink 896
```

   d. Configure an MBR for the Background traffic class.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v1
  pdp-qos-control qci 9 maximum-bit-rate-uplink 896
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v1
  pdp-qos-control qci 9 maximum-bit-rate-downlink 896
```

6. Configure the action to take for non-GBR PDP context requests when the MBR exceeds the configured value.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v1
  policer-action non-gbr-bearer violate-action transmit
```

7. Configure the action to take for GBR PDP context requests when the GBR exceeds the configured value.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v1
  policer-action gbr-bearer exceed-action transmit
```

8. Configure the action to take for GBR PDP context requests when the MBR exceeds the configured value.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v1
  policer-action gbr-bearer violate-action transmit
```

**Results** From configuration mode, confirm your configuration by entering the **show** command at the various hierarchy levels. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

If you are done configuring the device, enter **commit** from configuration mode.

## Configuring a CoS Policy Profile for Visiting Subscribers on a 4G Network

**CLI Quick Configuration** To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge cos-cac cos-policy-profiles visitor_v2 default-bearer-qci 6 upgrade
set unified-edge cos-cac cos-policy-profiles visitor_v2 allocation-retention-priority 5
  upgrade
set unified-edge cos-cac cos-policy-profiles visitor_v2 aggregate-qos-control
  maximum-bit-rate-uplink 1600
set unified-edge cos-cac cos-policy-profiles visitor_v2 aggregate-qos-control
  maximum-bit-rate-downlink 1600
set unified-edge cos-cac cos-policy-profiles visitor_v2 policer-action non-gbr-bearer
  violate-action transmit
```

**Step-by-Step Procedure** To configure a CoS policy profile for visitor subscribers in a 4G network:

1. Specify a name for the CoS policy profile, negotiate the QoS Class Identifier (QCI) for 4G subscribers, and specify the **upgrade** option to upgrade the QCI value of bearer requests that come in with a lower QCI (numerically higher) than the configured value and downgrade requests with a higher QCI.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v2
  default-bearer-qci 6 upgrade
```

2. Specify that bearers that come in with a lower ARP (numerically higher) than the configured value are accepted and bearers with a higher ARP (numerically lower) are downgraded to the configured value (default behavior).

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v2
  allocation-retention-priority 5
```

NOTE: If the allocation-retention-priority value is not specified, the broadband gateway uses the UE/SGW requested or negotiated ARP value.

3. Specify that bearers that come in with a lower MBR value than the configured value are upgraded to the configured MBR value, and bearers that come in with a higher MBR values than the configured value are downgraded to the configured MBR value.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v2
  aggregate-qos-control maximum-bit-rate-uplink 1600
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v2
  aggregate-qos-control maximum-bit-rate-downlink 1600
```

4. Configure the action to take for bearers when the AMBR exceeds the configured value.

```
[edit]
user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles visitor_v2
  policer-action non-gbr-bearer violate-action transmit
```

**Results** From configuration mode, confirm your configuration by entering the **show** command at the various hierarchy levels. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

If you are done configuring the device, enter **commit** from configuration mode.

## Configuring a System-Wide CoS Policy Profile

**CLI Quick Configuration** To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge cos-cac cos-policy-profiles system_wide default-bearer-qci 6
set unified-edge cos-cac cos-policy-profiles system_wide allocation-retention-priority 5
set unified-edge cos-cac cos-policy-profiles system_wide pdp-qos-control
  maximum-bit-rate-uplink 512
set unified-edge cos-cac cos-policy-profiles system_wide pdp-qos-control
  maximum-bit-rate-downlink 512
set unified-edge cos-cac cos-policy-profiles system_wide pdp-qos-control
  guaranteed-bit-rate-uplink 512
set unified-edge cos-cac cos-policy-profiles system_wide pdp-qos-control
  guaranteed-bit-rate-downlink 512
set unified-edge cos-cac cos-policy-profiles system_wide pdp-qos-control qci 6
  maximum-bit-rate-uplink 256
set unified-edge cos-cac cos-policy-profiles system_wide pdp-qos-control qci 6
  maximum-bit-rate-downlink 256
set unified-edge cos-cac cos-policy-profiles system_wide pdp-qos-control qci 7
  maximum-bit-rate-uplink 256
set unified-edge cos-cac cos-policy-profiles system_wide pdp-qos-control qci 7
  maximum-bit-rate-downlink 256
set unified-edge cos-cac cos-policy-profiles system_wide pdp-qos-control qci 8
  maximum-bit-rate-uplink 256
set unified-edge cos-cac cos-policy-profiles system_wide pdp-qos-control qci 8
  maximum-bit-rate-downlink 256
set unified-edge cos-cac cos-policy-profiles system_wide pdp-qos-control qci 9
  maximum-bit-rate-uplink 256
set unified-edge cos-cac cos-policy-profiles system_wide pdp-qos-control qci 9
  maximum-bit-rate-downlink 256
```

```
set unified-edge cos-cac cos-policy-profiles system_wide aggregate-qos-control
  maximum-bit-rate-uplink 256
set unified-edge cos-cac cos-policy-profiles system_wide aggregate-qos-control
  maximum-bit-rate-downlink 256
set unified-edge cos-cac cos-policy-profiles system_wide policer-action gbr-bearer
  exceed-action transmit
set unified-edge cos-cac cos-policy-profiles system_wide policer-action gbr-bearer
  violate-action transmit
set unified-edge cos-cac cos-policy-profiles system_wide policer-action non-gbr-bearer
  violate-action transmit
```

**Step-by-Step Procedure**

To configure a CoS policy profile for subscribers in 3G and 4G networks:

1. Specify a name for the CoS policy profile, negotiate the QCI for 3G/4G subscribers, and accept bearer requests that come in with a lower traffic class/QCI than the configured value and downgrade requests with a higher traffic class/QCI.

   ```
   [edit]
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles system_wide
     default-bearer-qci 6
   ```

2. Specify that bearers that come in with a lower ARP (numerically higher) than the configured value are accepted and bearers with a higher ARP (numerically lower) are downgraded to the configured value (the default behavior).

   ```
   [edit]
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles system_wide
     allocation-retention-priority 5
   ```

3. Specify that PDP context requests that come in with a lower MBR value than the configured value are accepted and PDP context requests that come in with a higher MBR value than the configured value are downgraded to the configured MBR value.

   ```
   [edit]
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles system_wide
     pdp-qos-control maximum-bit-rate-uplink 512
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles system_wide
     pdp-qos-control maximum-bit-rate-downlink 512
   ```

4. Specify that PDP context requests that come in with a lower GBR value than the configured value are accepted, and PDP context requests that come in with a higher GBR value than the configured value are downgraded to the configured GBR value.

   ```
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles system_wide
     pdp-qos-control guaranteed-bit-rate-uplink 512
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles system_wide
     pdp-qos-control guaranteed-bit-rate-downlink 512
   ```

5. Configure the uplink and downlink maximum bit rates for the non-GBR traffic classes:

   a. Configure an MBR for the Interactive traffic class with THP 1 (without signaling indication).

      ```
      [edit]
      user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles system_wide
        pdp-qos-control qci 6 maximum-bit-rate-uplink 256
      user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles system_wide
        pdp-qos-control qci 6 maximum-bit-rate-downlink 256
      ```

   b. Configure an MBR for the Interactive traffic class with THP 2.

      ```
      [edit]
      user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles system_wide
        pdp-qos-control qci 7 maximum-bit-rate-uplink 256
      user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles system_wide
        pdp-qos-control qci 7 maximum-bit-rate-downlink 256
      ```

   c. Configure an MBR for the Interactive traffic class with THP 3.

      ```
      [edit]
      user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles system_wide
        pdp-qos-control qci 8 maximum-bit-rate-uplink 256
      user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles system_wide
        pdp-qos-control qci 8 maximum-bit-rate-downlink 256
      ```

   d. Configure an MBR for the Background traffic class.

      ```
      [edit]
      user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles system_wide
        pdp-qos-control qci 9 maximum-bit-rate-uplink 256
      user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles system_wide
        pdp-qos-control qci 9 maximum-bit-rate-downlink 256
      ```

6. Configure the action to take for non-GBR bearer requests when the AMBR or MBR exceeds the configured value.

   ```
   [edit]
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles system_wide
     policer-action non-gbr-bearer violate-action transmit
   ```

7. Configure the action to take for GBR PDP context requests when the GBR exceeds the configured value.

   ```
   [edit]
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles system_wide
     policer-action gbr-bearer exceed-action transmit
   ```

8. Configure the action to take for GBR PDP context requests when the MBR exceeds the configured value.

   ```
   [edit]
   user@ggsn-pgw# set unified-edge cos-cac cos-policy-profiles system_wide
     policer-action gbr-bearer violate-action transmit
   ```

**Results** From configuration mode, confirm your configuration by entering the **show** command at the various hierarchy levels. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

If you are done configuring the device, enter **commit** from configuration mode.

## Configuring Bandwidth Pools

**Step-by-Step Procedure** You configure a bandwidth pools for uplink and downlink subscriber traffic to ensure that sufficient bandwidth is available when packet data protocol (PDP) contexts are created or modified. Call admission control (CAC) uses the bandwidth pools to negotiate and reserve bandwidth for PDP contexts with a guaranteed bit rate (GBR).

1. Specify a name for the uplink bandwidth pool.

   ```
   [edit ]
   user@host# edit unified-edge cos-cac gbr-bandwidth-pools bw_pool_uplink
   ```

2. Specify a name for the downlink bandwidth pool.

   ```
   [edit ]
   user@host# edit unified-edge cos-cac gbr-bandwidth-pools bw_pool_downlink
   ```

3. Configure the total bandwidth for each bandwidth pool, in megabits per second (Mbps).

   ```
   [edit]
   user@host# set unified-edge cos-cac bandwidth-pools bw_pool_uplink bandwidth
     125000
   user@host# set unified-edge cos-cac bandwidth-pools bw_pool_downlink bandwidth
     500000
   ```

4. (Optional) Specify that when bearer load reaches the configured bandwidth threshold for uplink or downlink, the create/modify PDP context requests can be downgraded, starting with lower priority requests.

   ```
   [edit]
   user@host# set unified-edge cos-cac bandwidth-pools bw_pool_uplink
     downgrade-gtp-v1-gbr-bearers
   user@host# set unified-edge cos-cac bandwidth-pools bw_pool_downlink
     downgrade-gtp-v1-gbr-bearers
   ```

NOTE: If the **downgrade-gtp-v1-gbr-bearers** option is configured and the bandwidth threshold is reached, create or modify PDP context requests arriving on the broadband gateway are downgraded to the Background traffic class. If the **downgrade-gtp-v1-gbr-bearers** option is not configured and the bandwidth threshold is reached, create or modify PDP context requests arriving on the broadband gateway are rejected.

## Configuring a Local Policy for 3G Networks

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
edit unified-edge local-policies local_v1
set unified-edge local-policies local_v1 resource-threshold-profile resource_pgw
set unified-edge local-policies local_v1 classifier-profile home_pgw
set unified-edge local-policies local_v1 cos-policy-profile home_v1
set unified-edge local-policies local_v1 roamer-classifier-profile roamer_pgw
set unified-edge local-policies local_v1 roamer-cos-policy-profile roamer_v1
set unified-edge local-policies local_v1 visitor-classifier-profile visitor_pgw
set unified-edge local-policies local_v1 visitor-cos-policy-profile visitor_v1
set unified-edge local-policies local_v1 dl-bandwidth-pool bw_pool_downlink
set unified-edge local-policies local_v1 ul-bandwidth-pool bw_pool_uplink
```

**Step-by-Step Procedure**

A local policy defines the QoS treatment to be applied to the broadband gateway at the system level or APN level.

To configure a local policy:

1. Specify a name for the local policy.

   ```
   [edit]
   user@ggsn-pgw# edit unified-edge local-policies local_v1
   ```

2. Specify a resource threshold profile for the local policy to define admission control for managing system overload conditions.

   ```
   [edit]
   user@ggsn-pgw# set unified-edge local-policies local_v1 resource-threshold-profile
     resource_pgw
   ```

3. Specify the classifier profiles for the local policy to define the mapping of traffic classes and QCIs to a forwarding class and loss priority.

   ```
   [edit]
   user@ggsn-pgw# set unified-edge local-policies local_v1 classifier-profile home_pgw
   user@ggsn-pgw# set unified-edge local-policies local_v1 roamer-classifier-profile
     roamer_pgw
   user@ggsn-pgw# set unified-edge local-policies local_v1 visitor-classifier-profile
     visitor_pgw
   ```

4. Specify the CoS policy profiles for the local policy to define the QoS parameters for bearer setup and teardown.

   ```
   [edit]
   user@ggsn-pgw# set unified-edge local-policies local_v1 cos-policy-profile home_v1
   user@ggsn-pgw# set unified-edge local-policies local_v1 roamer-cos-policy-profile
     roamer_v1
   user@ggsn-pgw# set unified-edge local-policies local_v1 visitor-cos-policy-profile
     visitor_v1
   ```

5. Specify a bandwidth pool for downlink traffic.

   ```
   [edit]
   ```

```
user@host# set unified-edge local-policies local_v1 dl-bandwidth-pool
  bw_pool_downlink
```

6. Specify a bandwidth pool for uplink traffic.

```
[edit]
user@host# set unified-edge local-policies local_v1 ul-bandwidth-pool
  bw_pool_uplink
```

**Results** From configuration mode, confirm your configuration by entering the **show** command at the various hierarchy levels. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

If you are done configuring the device, enter **commit** from configuration mode.

## Configuring a Local Policy for 4G Networks

**CLI Quick Configuration** To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
edit unified-edge local-policies local_v2
set unified-edge local-policies local_v2 resource-threshold-profile resource_pgw
set unified-edge local-policies local_v2 classifier-profile home_pgw
set unified-edge local-policies local_v2 cos-policy-profile home_v2
set unified-edge local-policies local_v2 roamer-classifier-profile roamer_pgw
set unified-edge local-policies local_v2 roamer-cos-policy-profile roamer_v2
set unified-edge local-policies local_v2 visitor-classifier-profile visitor_pgw
set unified-edge local-policies local_v2 visitor-cos-policy-profile visitor_v2
set unified-edge local-policies local_v2 dl-bandwidth-pool bw_pool_downlink
set unified-edge local-policies local_v2 ul-bandwidth-pool bw_pool_uplink
```

**Step-by-Step Procedure** A local policy defines the QoS treatment to be applied to the broadband gateway at the system level or APN level.

To configure a local policy:

1. Specify a name for the local policy.

```
[edit]
user@ggsn-pgw# edit unified-edge local-policies local_v2
```

2. Specify a resource threshold profile for the local policy to define admission control for managing system overload conditions.

```
[edit]
user@ggsn-pgw# set unified-edge local-policies local_v2 resource-threshold-profile
  resource_pgw
```

3. Specify the classifier profiles for the local policy to define the mapping of QCIs to a forwarding class and loss priority.

```
[edit]
user@ggsn-pgw# set unified-edge local-policies local_v2 classifier-profile home_pgw
user@ggsn-pgw# set unified-edge local-policies local_v2 roamer-classifier-profile
  roamer_pgw
```

```
user@ggsn-pgw# set unified-edge local-policies local_v2 visitor-classifier-profile
  visitor_pgw
```

4. Specify the CoS policy profiles for the local policy to define the QoS parameters for bearer setup and teardown.

```
[edit]
user@ggsn-pgw# set unified-edge local-policies local_v2 cos-policy-profile home_v2
user@ggsn-pgw# set unified-edge local-policies local_v2 roamer-cos-policy-profile
  roamer_v2
user@ggsn-pgw# set unified-edge local-policies local_v2 visitor-cos-policy-profile
  visitor_v2
```

5. Specify a bandwidth pool for downlink traffic.

```
[edit ]
user@host# set unified-edge local-policies local_v2 dl-bandwidth-pool
  bw_pool_downlink
```

6. Specify a bandwidth pool for uplink traffic.

```
[edit ]
user@host# set unified-edge local-policies local_v2 ul-bandwidth-pool
  bw_pool_uplink
```

**Results** From configuration mode, confirm your configuration by entering the **show** command at the various hierarchy levels. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

If you are done configuring the device, enter **commit** from configuration mode.

## Configuring a System-Wide Local Policy

**CLI Quick Configuration** To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
edit unified-edge local-policies local_system_wide
set unified-edge local-policies local_system_wide resource-threshold-profile resource_pgw
set unified-edge local-policies local_system_wide classifier-profile system_wide
set unified-edge local-policies local_system_wide cos-policy-profile system_wide
set unified-edge local-policies local_system_wide dl-bandwidth-pool bw_pool_downlink
set unified-edge local-policies local_system_wide ul-bandwidth-pool bw_pool_uplink
```

**Step-by-Step Procedure** A local policy defines the QoS treatment to be applied to the broadband gateway at the system level or APN level.

To configure a system-wide local policy:

1. Specify a name for the local policy.

```
[edit]
user@ggsn-pgw# edit unified-edge local-policies local_system_wide
```

2. Specify a resource threshold profile for the local policy to define admission control for managing system overload conditions.

```
[edit]
user@ggsn-pgw# set unified-edge local-policies local_system_wide
  resource-threshold-profile resource_pgw
```

3. Specify the classifier profile for the local policy to define the mapping of traffic classes and QCIs to a forwarding class and loss priority.

```
[edit]
user@ggsn-pgw# set unified-edge local-policies local_system_wide classifier-profile
  system_wide
```

4. Specify the CoS policy profiles for the local policy to define the QoS parameters for bearer setup and teardown.

```
[edit]
user@ggsn-pgw# set unified-edge local-policies local_system_wide
  cos-policy-profile system_wide
```

5. Specify a bandwidth pool for downlink traffic.

```
[edit ]
user@host# set unified-edge local-policies local_system_wide dl-bandwidth-pool
  bw_pool_downlink
```

6. Specify a bandwidth pool for uplink traffic.

```
[edit ]
user@host# set unified-edge local-policies local_system_wide ul-bandwidth-pool
  bw_pool_uplink
```

**Results** From configuration mode, confirm your configuration by entering the **show** command at the various hierarchy levels. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

If you are done configuring the device, enter **commit** from configuration mode.

### Applying the Local Policies

**CLI Quick Configuration** To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set gateways ggsn-pgw MBG1 local-policy-profile local_system_wide
set gateways ggsn-pgw MBG1 apn-services apns qosv1.com local-policy-profile local_v1
set gateways ggsn-pgw MBG1 apn-services apns qosv2.com local-policy-profile local_v2
```

**Step-by-Step Procedure** You apply a local policy at the system level or APN level. A local policy applied at the APN level overrides a local policy at the system level.

1. At the gateway level, apply the system-wide local policy.

```
[edit]
user@host# set gateways ggsn-pgw MBG1 local-policy-profile local_system_wide
```

2. At the APN level, apply the local policy for 3G subscriber traffic.

```
[edit]
```

```
user@host# set gateways ggsn-pgw MBG1 apn-services apns qosv1.com
  local-policy-profile local_v1
```

3. At the APN level, apply the local policy for 4G subscriber traffic.

```
[edit]
user@host# set gateways ggsn-pgw MBG1 apn-services apns qosv2.com
  local-policy-profile local_v2
```

## Configuring DSCP Ingress Rewrite Rules for IPv4 Packets

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
edit class-of-service rewrite-rules dscp dscpv4_ingress_rw]
set class-of-service rewrite-rules dscp dscpv4_ingress_rw forwarding class af1 loss-priority
  high code-point 001110
set class-of-service rewrite-rules dscp dscpv4_ingress_rw forwarding class af1 loss-priority
  low code-point 001010
set class-of-service rewrite-rules dscp dscpv4_ingress_rw forwarding class af2 loss-priority
  high code-point 010110
set class-of-service rewrite-rules dscp dscpv4_ingress_rw forwarding class af2 loss-priority
  low code-point 010010
set class-of-service rewrite-rules dscp dscpv4_ingress_rw forwarding class af3 loss-priority
  high code-point 011110
set class-of-service rewrite-rules dscp dscpv4_ingress_rw forwarding class af3 loss-priority
  low code-point 011010
set class-of-service rewrite-rules dscp dscpv4_ingress_rw forwarding class af4 loss-priority
  high code-point 100110
set class-of-service rewrite-rules dscp dscpv4_ingress_rw forwarding class af4 loss-priority
  low code-point 100010
```

**Step-by-Step Procedure**

To configure the ingress rewrite rules for IPv4 packets:

1. Specify a name for the ingress rewrite rules.

```
[edit]
user@host# edit class-of-service rewrite-rules dscp dscpv4_ingress_rw
```

2. Configure the ingress rewrite rules mappings for traffic on the mobile interface.

```
[edit]
user@host# set class-of-service rewrite-rules dscp dscpv4_ingress_rw forwarding
  class af1 loss-priority high code-point 001110
user@host# set class-of-service rewrite-rules dscp dscpv4_ingress_rw forwarding
  class af1 loss-priority low code-point 001010
user@host# set class-of-service rewrite-rules dscp dscpv4_ingress_rw forwarding
  class af2 loss-priority high code-point 010110
user@host# set class-of-service rewrite-rules dscp dscpv4_ingress_rw forwarding
  class af2 loss-priority low code-point 010010
user@host# set class-of-service rewrite-rules dscp dscpv4_ingress_rw forwarding
  class af3 loss-priority high code-point 011110
user@host# set class-of-service rewrite-rules dscp dscpv4_ingress_rw forwarding
  class af3 loss-priority low code-point 011010
user@host# set class-of-service rewrite-rules dscp dscpv4_ingress_rw forwarding
  class af4 loss-priority high code-point 100110
```

```
user@host# set class-of-service rewrite-rules dscp dscpv4_ingress_rw forwarding
  class af4 loss-priority low code-point 100010
```

### Configuring DSCP Ingress Rewrite Rules for IPv6 Packets

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
edit class-of-service rewrite-rules dscp dscpv6_ingress_rw
set class-of-service rewrite-rules dscp dscpv6_ingress_rw forwarding class af1 loss-priority
  high code-point 001110
set class-of-service rewrite-rules dscp dscpv6_ingress_rw forwarding class af1 loss-priority
  low code-point 001010
set class-of-service rewrite-rules dscp dscpv6_ingress_rw forwarding class af2 loss-priority
  high code-point 010110
set class-of-service rewrite-rules dscp dscpv6_ingress_rw forwarding class af2 loss-priority
  low code-point 010010
set class-of-service rewrite-rules dscp dscpv6_ingress_rw forwarding class af3 loss-priority
  high code-point 011110
set class-of-service rewrite-rules dscp dscpv6_ingress_rw forwarding class af3 loss-priority
  low code-point 011010
set class-of-service rewrite-rules dscp dscpv6_ingress_rw forwarding class af4 loss-priority
  high code-point 100110
set class-of-service rewrite-rules dscp dscpv6_ingress_rw forwarding class af4 loss-priority
  low code-point 100010
```

**Step-by-Step Procedure**

To configure the ingress rewrite rules for IPv6 packets:

1. Specify a name for the ingress rewrite rules.

   ```
   [edit]
   user@host# edit class-of-service rewrite-rules dscp-ipv6 dscpv6_ingress_rw
   ```

2. Configure the ingress rewrite rules mappings for traffic on the mobile interface.

   ```
   [edit]
   user@host# set class-of-service rewrite-rules dscp dscpv6_ingress_rw forwarding
     class af1 loss-priority high code-point 001110
   user@host# set class-of-service rewrite-rules dscp dscpv6_ingress_rw forwarding
     class af1 loss-priority low code-point 001010
   user@host# set class-of-service rewrite-rules dscp dscpv6_ingress_rw forwarding
     class af2 loss-priority high code-point 010110
   user@host# set class-of-service rewrite-rules dscp dscpv6_ingress_rw forwarding
     class af2 loss-priority low code-point 010010
   user@host# set class-of-service rewrite-rules dscp dscpv6_ingress_rw forwarding
     class af3 loss-priority high code-point 011110
   user@host# set class-of-service rewrite-rules dscp dscpv6_ingress_rw forwarding
     class af3 loss-priority low code-point 011010
   user@host# set class-of-service rewrite-rules dscp dscpv6_ingress_rw forwarding
     class af4 loss-priority high code-point 100110
   user@host# set class-of-service rewrite-rules dscp dscpv6_ingress_rw forwarding
     class af4 loss-priority low code-point 100010
   ```

## Configuring DSCP Egress Rewrite Rules for IPv4 Packets

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
edit class-of-service rewrite-rules dscp dscpv4_egress_rw
set class-of-service rewrite-rules dscp dscpv4_egress_rw forwarding class af1 loss-priority
  high code-point 001110
set class-of-service rewrite-rules dscp dscpv4_egress_rw forwarding class af1 loss-priority
  low code-point 001010
set class-of-service rewrite-rules dscp dscpv4_egress_rw forwarding class af2 loss-priority
  high code-point 010110
set class-of-service rewrite-rules dscp dscpv4_egress_rw forwarding class af2 loss-priority
  low code-point 010010
set class-of-service rewrite-rules dscp dscpv4_egress_rw forwarding class af3 loss-priority
  high code-point 011110
set class-of-service rewrite-rules dscp dscpv4_egress_rw forwarding class af3 loss-priority
  low code-point 011010
set class-of-service rewrite-rules dscp dscpv4_egress_rw forwarding class af4 loss-priority
  high code-point 100110
set class-of-service rewrite-rules dscp dscpv4_egress_rw forwarding class af4 loss-priority
  low code-point 100010
set class-of-service rewrite-rules dscp dscpv4_egress_rw forwarding class be loss-priority
  low code-point 000000
```

**Step-by-Step Procedure**

To configure the egress rewrite rules for IPv4 packets:

1. Specify a name for the egress rewrite rules.

   ```
   [edit ]
   user@host# edit class-of-service rewrite-rules dscp dscp_v4_egress_rw
   ```

2. Configure the egress rewrite rules mappings for traffic on the mobile interface.

   ```
   [edit]
   user@host# set class-of-service rewrite-rules dscp dscp_v4_egress_rw forwarding
     class af1 loss-priority high code-point 001110
   user@host# set class-of-service rewrite-rules dscp dscp_v4_egress_rw forwarding
     class af1 loss-priority low code-point 001010
   user@host# set class-of-service rewrite-rules dscp dscp_v4_egress_rw forwarding
     class af2 loss-priority high code-point 010110
   user@host# set class-of-service rewrite-rules dscp dscp_v4_egress_rw forwarding
     class af2 loss-priority low code-point 010010
   user@host# set class-of-service rewrite-rules dscp dscp_v4_egress_rw forwarding
     class af3 loss-priority high code-point 011110
   user@host# set class-of-service rewrite-rules dscp dscp_v4_egress_rw forwarding
     class af3 loss-priority low code-point 011010
   user@host# set class-of-service rewrite-rules dscp dscp_v4_egress_rw forwarding
     class af4 loss-priority high code-point 100110
   user@host# set class-of-service rewrite-rules dscp dscp_v4_egress_rw forwarding
     class af4 loss-priority low code-point 100010
   user@host# set class-of-service rewrite-rules dscp dscp_v4_egress_rw forwarding
     class be loss-priority low code-point 000000
   ```

## Configuring DSCP Egress Rewrite Rules for IPv6 Packets

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
edit class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw
set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw forwarding class af1
   loss-priority high code-point 001110
set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw forwarding class af1
   loss-priority low code-point 001010
set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw forwarding class af2
   loss-priority high code-point 010110
set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw forwarding class af2
   loss-priority low code-point 010010
set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw forwarding class af3
   loss-priority high code-point 011110
set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw forwarding class af3
   loss-priority low code-point 011010
set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw forwarding class af4
   loss-priority high code-point 100110
set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw forwarding class af4
   loss-priority low code-point 100010
set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw forwarding class be
   loss-priority low code-point 000000
```

**Step-by-Step Procedure**

To configure the ingress rewrite rules for IPv6 packets:

1. Specify a name for the egress rewrite rules.

   ```
   [edit]
   user@host# edit class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw
   ```

2. Configure the egress rewrite rules mappings for traffic on the mobile interface.

   ```
   [edit]
   user@host# set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw
      forwarding class af1 loss-priority high code-point 001110
   user@host# set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw
      forwarding class af1 loss-priority low code-point 001010
   user@host# set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw
      forwarding class af2 loss-priority high code-point 010110
   user@host# set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw
      forwarding class af2 loss-priority low code-point 010010
   user@host# set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw
      forwarding class af3 loss-priority high code-point 011110
   user@host# set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw
      forwarding class af3 loss-priority low code-point 011010
   user@host# set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw
      forwarding class af4 loss-priority high code-point 100110
   user@host# set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw
      forwarding class af4 loss-priority low code-point 100010
   user@host# set class-of-service rewrite-rules dscp-ipv6 dscpv6_egress_rw
      forwarding class be loss-priority low code-point 000000
   ```

### Applying Ingress Rewrite Rules to Mobile Interfaces for 3G and 4G Subscriber Traffic

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set class-of-service interfaces mif unit 0 ingress-rewrite-rules dscp dscpv4_ingress_rw
set class-of-service interfaces mif unit 0 ingress-rewrite-rules dscp-ipv6 dscpv6_ingress_rw
set class-of-service interfaces mif unit 1 ingress-rewrite-rules dscp dscpv4_ingress_rw
set class-of-service interfaces mif unit 1 ingress-rewrite-rules dscp-ipv6 dscpv6_ingress_rw
```

**Step-by-Step Procedure**

To specify the ingress rewrite rules to apply to rewrite DSCPv4 and DSCPv6 values for incoming subscriber packets on the mif.0 and mif.1 mobile interfaces, which correspond to the **qosv1.com** and **qosv2.com** APNs for 3G subscriber traffic and 4G subscriber traffic, respectively:

1. To apply ingress rewrite rules to change DSCPv4 and DSCPv6 values in the outer IP header of 3G subscriber packets arriving on the **qosv1.com** APN (mif.0), specify the names of the rewrite rules that you want to apply to the mobile interface.

   ```
   [edit]
   user@host# set class-of-service interfaces mif unit 0 ingress-rewrite-rules dscp
     dscpv4_ingress_rw
   user@host# set class-of-service interfaces mif unit 0 ingress-rewrite-rules dscp-ipv6
     dscpv6_ingress_rw
   ```

2. To apply ingress rewrite rules to change DSCPv4 and DSCPv6 values in the outer IP header of 4G subscriber packets arriving on the **qosv2.com** APN (mif.1), specify the names of the rewrite rules that you want to apply to the mobile interface.

   ```
   [edit]
   user@host# set class-of-service interfaces mif unit 1 ingress-rewrite-rules dscp
     dscpv4_ingress_rw
   user@host# set class-of-service interfaces mif unit 1 ingress-rewrite-rules dscp-ipv6
     dscpv6_ingress_rw
   ```

### Applying Egress Rewrite Rules to Mobile Interfaces for 3G and 4G Subscriber Traffic

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set class-of-service interfaces mif unit 0 rewrite-rules dscp dscpv4_egress_rw protocol
  gtp-inet-both
set class-of-service interfaces mif unit 0 rewrite-rules dscp dscpv6_egress_rw protocol
  gtp-inet-both
set class-of-service interfaces mif unit 1 rewrite-rules dscp dscpv4_egress_rw protocol
  gtp-inet-both
set class-of-service interfaces mif unit 1rewrite-rules dscp dscpv6_egress_rw protocol
  gtp-inet-both
```

**Step-by-Step Procedure**

To apply an egress rewrite rule to rewrite DSCPv4 and DSCPv6 values to both the inner and outer IP headers of downstream subscriber packets, specify the name of the rewrite rules you want to apply to the mobile interfaces and include the **gtp-inet-both** option:

1. To apply egress rewrite rules to change DSCPv4 and DSCPv6 values in the outer IP header of 3G subscriber packets arriving on the **qosv1.com** APN (mif.0), specify the names of the rewrite rules that you want to apply to the mobile interface.

```
[edit]
user@host# set class-of-service interfaces mif unit 0 rewrite-rules dscp
  dscpv4_egress_rw protocol gtp-inet-both
user@host# set class-of-service interfaces mif unit 0 rewrite-rules dscp
  dscpv6_egress_rw protocol gtp-inet-both

[edit]
user@host# set class-of-service interfaces mif unit 1 rewrite-rules dscp
  dscpv4_egress_rw protocol gtp-inet-both
user@host# set class-of-service interfaces mif unit 1 rewrite-rules dscp
  dscpv6_egress_rw protocol gtp-inet-both
```

2. To apply ingress rewrite rules to change DSCPv4 and DSCPv6 values in the outer IP header of 4G subscriber packets arriving on the **qosv2.com** APN (mif.1), specify the names of the rewrite rules that you want to apply to the mobile interface.

```
[edit]
user@host# set class-of-service interfaces mif unit 1 rewrite-rules dscp
  dscpv4_egress_rw protocol gtp-inet-both
user@host# set class-of-service interfaces mif unit 1 rewrite-rules dscp
  dscpv6_egress_rw protocol gtp-inet-both
```

### Configuring the Maximum Number of Bearers

**Step-by-Step Procedure**

You configure the maximum bearers to specify an upper limit on the number of bearers allowed at the system level and, optionally, the APN level. When the total number of active bearers at the system level or APN level reaches the maximum configured limit, the broadband gateway rejects new bearer requests.

To configure the maximum number of active bearers:

1. Configure the number of maximum bearers allowed at the system level.

```
[edit]
user@host# set unified-edge gateways ggsn-pgw MBG1 maximum-bearers 5000000
```

### Enabling Preemption

**Step-by-Step Procedure**

You can enable preemption at the system level to enable the preemption capability indicator (PCI) and preemption vulnerability indicator (PVI) flags. Preemption is disabled by default.

To enable preemption or both 3G (GTPv1) and 4G (GTPv2) subscriber traffic:

1. Configure preemption at the system level.

```
[edit]
```

```
user@host# set unified-edge gateways ggsn-pgw MBG1 preemption enable
```

## Verification

To display QoS statistics for 3G and 4G subscriber packets to verify that the QoS configuration on the broadband gateway is working properly, you can perform the following tasks:



### Display QoS Statistics for 4G Subscriber Packets with a Specified Allocation Retention Priority:

**Purpose** Verify that the QoS configuration is working properly by displaying statistics such as session establishment attempts, peer initiated sessions, and gateway initiated session deactivations.

**Action**

```
user@host> show unified-edge ggsn-pgw statistics arp 10
Control plane statistics:
    Gn/S5 signaling msgs rcvd:                  0
    Gn/S5 signaling msgs sent:                  50001
    Gn/S5 signaling msgs dropped:               0
    Gn/S5 signaling bytes rcvd:                 0
    Gn/S5 signaling bytes sent:                 0
    Total GTP tunnels created:                  0
    Session establishment attempts:             50221
    Successful session establishments:          4476
    MS/peer initiated session deactivations:    0
    Successful MS/peer initiated deactivations: 0
    Gateway initiated session deactivations:    0
    Successful gateway initiated deactivations: 0
    Session Establishments Failed (by GTP cause):
        Others               0
        Service unavailable: 0
        System failure:      0
        No resources:        47762
        No address:          0
        Service denied:      0
        Authentication Fail: 0
        APN access denied:   0
Data plane GTP statistics (Gn/S5/S8):
    Input     packets:          0
    Input     bytes:            0
    Output    packets:          0
    Output    bytes:            0
    Discarded packets:          0
Data plane GTP statistics (Gi):
    Input     packets:          0
    Input     bytes:            0
```

```
    Output    packets:          0
    Output    bytes:            0
    Discarded packets:          0
```

**Meaning** This output shows the attempted session requests and the requests that were successfully established for 4G subscriber traffic with the specified ARP value.

### Display 4G Subscriber Information for Traffic Marked with a Specified QCI

**Purpose** Verify that the QoS configuration is working properly for 4G subscribers by showing statistics for subscriber packets with a specified QCI.

**Action**

```
user@host> show unified-edge ggsn-pgw statistics qci 5
 regress@brainstorm> show unified-edge ggsn-pgw qos statistics qci 5
Control plane statistics:
    Gn/S5 signaling msgs rcvd:                  0
    Gn/S5 signaling msgs sent:                  10
    Gn/S5 signaling msgs dropped:               0
    Gn/S5 signaling bytes rcvd:                 0
    Gn/S5 signaling bytes sent:                 0
    Total GTP tunnels created:                  0
    Session establishment attempts:             10
    Successful session establishments:          10
    MS/peer initiated session deactivations:    0
    Successful MS/peer initiated deactivations: 0
    Gateway initiated session deactivations:    0
    Successful gateway initiated deactivations: 0
    Session Establishments Failed (by GTP cause):
        Others               0
        Service unavailable: 0
        System failure:      0
        No resources:        0
        No address:          0
        Service denied:      0
        Authentication Fail: 0
        APN access denied:   0
```

**Meaning** This output shows the Create Session requests that were successfully established for 4G mobile subscriber packets with the specified QCI value.

### Display 3G Subscriber Information for Traffic Marked with the Specified Traffic Class

**Purpose** Verify that the QoS configuration is working properly for 3G subscribers by showing statistics for subscriber packets of the specified traffic class.

**Action**

```
user@host> show unified-edge ggsn-pgw statistics traffic-class conversational
 Control plane statistics:
    Gn/S5 signaling msgs rcvd:                  0
    Gn/S5 signaling msgs sent:                  15
    Gn/S5 signaling msgs dropped:               0
    Gn/S5 signaling bytes rcvd:                 0
    Gn/S5 signaling bytes sent:                 0
    Total GTP tunnels created:                  0
    Session establishment attempts:             15
```

```
    Successful session establishments:          15
    MS/peer initiated session deactivations:    0
    Successful MS/peer initiated deactivations: 0
    Gateway initiated session deactivations:    0
    Successful gateway initiated deactivations: 0
    Session Establishments Failed (by GTP cause):
        Others              0
        Service unavailable: 0
        System failure:     0
        No resources:       0
        No address:         0
        Service denied:     0
        Authentication Fail: 0
        APN access denied:  0
Data plane GTP statistics (Gn/S5/S8):
    Input     packets:          0
    Input     bytes:            0
    Output    packets:          0
    Output    bytes:            0
    Discarded packets:          0
Data plane GTP statistics (Gi):
    Input     packets:          0
    Input     bytes:            0
    Output    packets:          0
    Output    bytes:            0
    Discarded packets:          0
```

**Meaning** This output shows the Create Session requests that were successfully established for 3G subscriber traffic of the conversational class.

### Display the Requested and Negotiated QoS Parameters for Mobile Subscribers

**Purpose** Verify the negotiated QoS parameters for a mobile subscriber.

**Action**

```
user@host> show unified-edge ggsn-pgw subscribers extensive
Subscriber Information:
    IMSI: 332215553443196    IMEI: 1122334455667795
    MSISDN: 3326555562       Time Zone: None    (DST): None
    Status: Visitor
User Location Info:
      MCC:  None  MNC:  None
      LAC: 0x0  CI: 0x0     SAC: 0x0  RAC: 0x0  TAC: 0x0  ECI: 0x0
    RAT Type: E-UTRAN
  PDN Session:
    APN name: juniper.com
    IPv4 Address: 20.0.4.8          IPv6 Address: None
    Direct Tunnel: Disabled         Session Duration: 3d 20:38:38
    Local Control address: 10.1.1.1 Remote Control address: 30.1.1.2
    TEID Control Local: 0x9001800   TEID Control Remote: 0x10d
    Peer CSID: 0                    Remote CSID: 0
    Addressing scheme: Local        Selection mode: from-ms
    Session PIC: 0 /0  (FPC/PIC)    Anchor PFE: 2 /0  (FPC/PIC)
    Session State: Established      GTP Version: 2
    Serving network: MCC: 231  MNC :215
    Negotiated APN AMBR: Downlink: 1000 kbps    Uplink: 1000 kbps
    Requested APN AMBR: Downlink: 1000 kbps     Uplink: 1000 kbps
  Bearer:
    NSAPI/EBI: 5                     Charging ID: 0x9001800
    Local Data address: 10.1.1.1     Remote Data address: 30.1.1.2
```

```
Local TEID: 0x111000              Remote TEID: 0x10e
Bearer State: Established         Substate: -
Idle Timeout: 0   min(0 -0,0)   AAA Interim Interval: 0   min(0 -0,0)
Negotiated QoS Parameters:
 QCI: 5    ARP: 11/0 /0   (PL/PVI/PCI)
 Forwarding Class:  -              Loss Priority:  -
Requested QoS Parameters:
 QCI :5   ARP : 11/0 /0   (PL/PVI/PCI)
Charging information:
 Profile ID: 0
 State: Init         Previous State: Init
```

**Meaning** This output shows the negotiated and requested QoS parameters for mobile subscribers.

**Related Documentation**

- Quality of Service Overview on page 318
- Call Admission Control Overview on page 324
- Class of Service (CoS) Policy Profile Overview on page 327
- Policing Subscriber Traffic on the Broadband Gateway Overview on page 328
- Configuring QoS on the Broadband Gateway Overview on page 333
- Configuring S-GW-Specific CAC Parameters on page 396
- Example: Configuring QoS and CAC on a S-GW on page 397

## Verifying Quality of Service

**Purpose** Display QoS statistics for subscriber packets.

**Action**

- To display QoS statistics information for the specified gateway:

  user@host> **show unified-edge ggsn-pgw statistics** ***gateway***

- To display subscriber information for traffic marked with the specified GTPv1 allocation retention priority:

  user@host> **show unified-edge ggsn-pgw statistics gtpv1-arp** ***arp-value***

  NOTE: You can specify an ARP value of 1 through 3.

- To display subscriber information for traffic marked with the specified GTPv2 allocation retention priority:

  user@host> **show unified-edge ggsn-pgw statistics gtpv2-priority-level** ***arp-value***

  NOTE: You can specify an ARP value of 1 through 15.

- To display subscriber information for traffic marked with the specified GTPv1 allocation retention priority:

user@host> **show unified-edge ggsn-pgw statistics** ***gtpv1-arp***

- To display subscriber information for traffic marked with the specified QoS Class Identifier:

  user@host> **show unified-edge ggsn-pgw statistics qci** ***qci-value***

  NOTE: You can specify a QCI value of 1 through 9.

- To display subscriber information for traffic marked with the specified traffic class:

  user@host> **show unified-edge ggsn-pgw statistics traffic-class (background | conversational | interactive | streaming)**

- To display the status information for the interactive traffic class with a specified traffic handling priority:

  **show unified-edge ggsn-pgw statistics traffic-class interactive traffic-handling-priority***traffic-handling-priority*

  NOTE: You can specify a traffic-handling priority value of 1 through 3.

**Related Documentation**

- Configuring a Classifier Profile for 3G and 4G Networks on page 338
- Configuring a CoS Policy Profile for 3G and 4G Networks on page 348
- Configuring QoS on the Broadband Gateway Overview on page 333

## Configuring S-GW-Specific CAC Parameters

The MobileNext Broadband Gateway Serving Gateway (S-GW) uses three statements unique to the S-GW for connection admission control (CAC). This topic shows how to configure the CAC statements that are unique to the S-GW.

Before you begin configuring a S-GW CAC parameters on the broadband gateway, you should have done the following:

- Configured the chassis of the MobileNext Broadband Gateway
- Configured the interfaces used by the MobileNext Broadband Gateway

To establish the CAC parameters unique to the S-GW, you can establish values for the default bearers as a percentage of anchor PFEs, the guaranteed bandwidth of the anchor PFEs, and maximum number of bearers for the anchor PFE. The use of all three statements is optional and all have default values.

To configure the S-GW CAC parameters:

1. Optionally, configure the S-GW anchor PFE default bearer percentage.

```
[edit unified-edge gateways sgw MBG-SGW1]
user@host# set anchor-pfe-default-bearers-percentage 50
```

NOTE: You can use any value from 10 through 100 percent.

2. Optionally, configure the S-GW anchor PFE guaranteed bandwidth.

```
[edit unified-edge gateways sgw MBG-SGW1]
user@host# set anchor-pfe-guaranteed-bandwidth 10
```

NOTE: You can use any value from 10 through 100 Gigibits per second.

3. Optionally, configure the S-GW anchor PFE maximum bearers.

```
[edit unified-edge gateways sgw MBG-SGW1]
user@host# set anchor-pfe-maximum-bearers 200
```

NOTE: You can use any value from 100 through 512 thousand bearers.

**Related Documentation**

- Quality of Service Overview on page 318
- Call Admission Control Overview on page 324
- Example: Configuring QoS and CAC on a S-GW on page 397

## Example: Configuring QoS and CAC on a S-GW

This example describes how to configure the MobileNext Broadband Gateway Serving Gateway (S-GW) for quality of service (QoS) and connection access control (CAC). The emphasis is on QoS and CAC configuration, and does not include many other parameters that a full S-GW configuration requires.

The example configures classifiers and resource thresholds for the S-GW for forwarding classes af1 and af3, setting thresholds for bearer loads, memory, and CPU usage. Preemption is enabled for the S-GW. Rewrite rules are also configured for ingress and egress traffic, setting DCSP bits for high and low loss priority for classes af1 and af3. The classifier and threshold profiles, as well as the rewrite rules, are applied to a S-GW with anchor Packet Forwarding Engine CAC parameters, specifically the S5 and S11 interfaces.



### Requirements

This example uses the following hardware and software components:

- Junos OS Release 11.4W

- Juniper Networks MobileNext Broadband Gateway

## Overview

This example describes how to configure the broadband gateway as a standalone S-GW (SGW-MBG1) with QoS and CAC parameters. The S-GW supports the following configuration:

- The S5 and S11 interfaces are in the main routing instance and use **xe-0/0/0** and **ge-5/0/2**, respectively.
- All eight queues are enabled, but only forwarding classes af1 and af3 have classifiers and rewrite rules for transport traffic.
- Rewrite rules for af1 and af3 are applied for ingress traffic on the S5 interface (**xe-0/0/0**) and egress traffic on the S11 interface (**ge-5/0/2**).

NOTE: This is not a complete S-GW configuration. This example illustrates QoS and CAC only.

## Configuration



### Configuring the interfaces

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set interface xe-0/0/0 description S5 interface
set interface xe-0/0/0 unit 0 family inet address 10.1.1.1/24
set interface ge-5/0/2 description S11 interface
set interface ge-5/0/2 unit 0 family inet address 172.16.1.1/24
```

**Step-by-Step Procedure**

To configure the IPv4 interfaces:

1. Configure the S5 interface.

   ```
   [edit interfaces]
   user@sgw1# set xe-0/0/0 description S5 interface
   user@sgw1# set xe-0/0/0 unit 0 family inet address 10.1.1.1/24
   ```

2. Configure the S11 interface.

```
[edit interfaces]
user@sgw1# set ge-5/0/2 description S11 interface
user@sgw1# set ge-5/0/2 unit 0 family inet address 172.16.1.1/24
```

### Configuring the IPv4 Interfaces

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set interfaces ge-0/0/0 unit 0 family inet address 10.44.0.1/16 description S5 interface
set interfaces ge-0/0/1 unit 0 family inet address 10.2.2.1/16 description S11 interface
```

**Step-by-Step Procedure**

To configure the IPv4 interfaces:

1. Configure IPv4 interfaces for the S5 interface.

   ```
   [edit]
   user@sgw1# set interfaces ge-0/0/0 unit 0 family inet address 10.44.0.1/16
   ```

2. Configure IPv4 interfaces for the S11 interface.

   ```
   [edit]
   user@sgw1# set interfaces ge-0/0/1 unit 0 family inet address 10.2.2.1/16
   ```

### Configuring the QoS and CAC Classifier and Resource Threshold Profiles and Parameters

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge cos-cac classifier-profiles classifier_v2
set unified-edge cos-cac classifier-profiles classifier_v2 qos-class-identifier 6
  forwarding-class af1 loss-priority low
set unified-edge cos-cac classifier-profiles classifier_v2 qos-class-identifier 3
  forwarding-class af3 loss-priority high
set unified-edge cos-cac resources-threshold-profiles resource_v2
set unified-edge cos-cac resources-threshold-profiles resource_v2 bearers-load low
  percentage 70
set unified-edge cos-cac resources-threshold-profiles resource_v2 bearers-load low
  gtpv2-priority-level 9
set unified-edge cos-cac resources-threshold-profiles resource_v2 bearers-load high
  percentage 90
set unified-edge cos-cac resources-threshold-profiles resource_v2 bearers-load high
  gtpv2-priority-level 5
set unified-edge cos-cac resources-threshold-profiles resource_v2 memory low percentage
  60
set unified-edge cos-cac resources-threshold-profiles resource_v2 memory low
  gtpv2-priority-level 8
set unified-edge cos-cac resources-threshold-profiles resource_v2 memory high percentage
  70
set unified-edge cos-cac resources-threshold-profiles resource_v2 memory high
  gtpv2-priority-level 4
set unified-edge cos-cac resources-threshold-profiles resource_v2 cpu low percentage 65
```

```
set unified-edge cos-cac resources-threshold-profiles resource_v2 cpu low
  gtpv2-priority-level 10
set unified-edge cos-cac resources-threshold-profiles resource_v2cpu high percentage
  80
set unified-edge cos-cac resources-threshold-profiles resource_v2 cpu high
  gtpv2-priority-level 7
set unified-edge local-policies local_profile_v2 resource-threshold-profiles resource_v2
set unified-edge local-policies local_profile_v2 classifier-profiles classifier_v2
```

**Step-by-Step Procedure**

To configure the QoS and CAC classifier and resource threshold profiles and parameters:

1. Configure classifier profile **classifier_v2**.

   ```
   [edit]
   user@sgw1# edit unified-edge cos-cac classifier-profiles classifier_v2
   ```

2. Specify the QoS parameters for af1 and af3.

   ```
   [edit unified-edge cos-cac classifier-profiles classifier_v2]
   user@sgw1# set qos-class-identifier 6 forwarding-class af1 loss-priority low
   user@sgw1# set qos-class-identifier 3 forwarding-class af3 loss-priority high
   ```

3. Configure resource threshold profile **resource_v2**.

   ```
   [edit]
   user@sgw1# edit unified-edge cos-cac resource-threshold-profiles resource_v2
   ```

4. Specify the resource threshold parameters for bearer load, memory, and CPU.

   ```
   [edit unified-edge cos-cac resource-threshold-profiles resource_v2]
   user@sgw1# set bearers-load low percentage 70
   user@sgw1# set bearers-load low gtpv2-priority-level 9
   user@sgw1# set bearers-load high percentage 90
   user@sgw1# set bearers-load high gtpv2-priority-level 5
   user@sgw1# set memory low percentage 60
   user@sgw1# set memory low gtpv2-priority-level 8
   user@sgw1# set memory high percentage 70
   user@sgw1# set memory high gtpv2-priority-level 4
   user@sgw1# set cpu low percentage 65
   user@sgw1# set cpu low gtpv2-priority-level 10
   user@sgw1# set cpu high percentage 80
   user@sgw1# set cpu high gtpv2-priority-level 7
   ```

5. Configure the local policy **local_profile_v2**.

   ```
   [edit]
   user@sgw1# edit unified-edge local-policies local_profile_v2
   ```

6. Configure the local policies for the classifier and resource threshold profiles.

   ```
   [edit unified-edge local-policies local_profile_v2]
   user@sgw1# set resource-threshold-profile resource_v2
   user@sgw1# set classifier-profile classifier_v2
   ```

### Configuring S-GW CAC Parameters

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways sgw SGW-MBG1 maximum-bearers 100000
set unified-edge gateways sgw SGW-MBG1 local-policy-profile local_profile_v2
set unified-edge gateways sgw SGW-MBG1 anchor-pfe-guaranteed-bandwidth 10 # Gbps
set unified-edge gateways sgw SGW-MBG1 anchor-pfe-maximum-bearers 100 # thousands
set unified-edge gateways sgw SGW-MBG1 anchor-pfe-guaranteed-bandwidth 10 # Gbps
set unified-edge gateways sgw SGW-MBG1 anchor-pfe-default-bearers-percentage 60
set unified-edge gateways sgw SGW-MBG1 preemption enable
```

**Step-by-Step Procedure**

To configure the S-GW CAC parameters:

1. Configure the maximum bearers and local policy profile.

```
[edit unified-edge gateways sgw SGW-MBG1]
user@sgw1# set maximum-bearers 100000
user@sgw1# set local-policy-profile local_profile_v2
```

2. Configure the anchor CAC parameters.

```
[edit unified-edge gateways sgw SGW-MBG1]
user@sgw1# set anchor-pfe-guaranteed-bandwidth 10 # Gbps
user@sgw1# set anchor-pfe-maximum-bearers 100 # thousands
user@sgw1# set anchor-pfe-default-bearers-percentage 60
user@sgw1# set preemption enable
```

## Configuring Forwarding Classes and Rewrite Rules

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set class-of-service forwarding-classes queue 0 be
set class-of-service forwarding-classes queue 1 ef
set class-of-service forwarding-classes queue 2 af1
set class-of-service forwarding-classes queue 3 af2
set class-of-service forwarding-classes queue 4 af3
set class-of-service forwarding-classes queue 5 af4
set class-of-service forwarding-classes queue 6 af5
set class-of-service forwarding-classes queue 7 nc
set class-of-service rewrite-rules dscp dscp_egress forwarding-class af1 loss-priority low
  code-point 001010
set class-of-service rewrite-rules dscp dscp_egress forwarding-class af3 loss-priority high
  code-point 011110
set class-of-service rewrite-rules dscp dscp_ingress forwarding-class af1 loss-priority low
  code-point 001010
set class-of-service rewrite-rules dscp dscp_ingress forwarding-class af3 loss-priority high
  code-point 011110
```

**Step-by-Step Procedure**

To configure forwarding classes and rewrite rules:

1. Configure the forwarding classes.

```
[edit class-of-service]
user@sgw1# set forwarding-classes queue 0 be
user@sgw1# set forwarding-classes queue 1 ef
user@sgw1# set forwarding-classes queue 2 af1
```

```
user@sgw1# set forwarding-classes queue 3 af2
user@sgw1# set forwarding-classes queue 4 af3
user@sgw1# set forwarding-classes queue 5 af4
user@sgw1# set forwarding-classes queue 6 af5
user@sgw1# set forwarding-classes queue 7 nc
```

2. Configure the rewrite rules.

```
[edit class-of-service]
user@sgw1# set rewrite-rules dscp dscp_egress forwarding-class af1 loss-priority
  low code-point 001010
user@sgw1# set rewrite-rules dscp dscp_egress forwarding-class af3 loss-priority
  high code-point 011110
user@sgw1# set rewrite-rules dscp dscp_ingress forwarding-class af1 loss-priority
  low code-point 001010
user@sgw1# set rewrite-rules dscp dscp_ingress forwarding-class af3 loss-priority
  high code-point 011110
```

### Apply the Rewrite Rule for Ingress (S5) and Egress (S11)

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set class-of-service interfaces xe-0/0/0 unit 0 rewrite-rules dscp dcsp_ingress
set class-of-service interfaces ge-5/0/2 unit 0 rewrite-rules dscp dcsp_egress
```

**Step-by-Step Procedure**

To configure the rewrite rules on the S5 and S11 interfaces:

1. Configure the ingress rewrite rule on the S5 interface.

```
[edit class-of-service]
user@sgw1# set interfaces xe-0/0/0 unit 0 rewrite-rules dscp dcsp_ingress
```

2. Configure the egress rewrite rule on the S11 interface.

```
[edit class-of-service]
user@sgw1# set interfaces ge-5/0/2 unit 0 rewrite-rules dscp dcsp_egress
```

**Related Documentation**

- Quality of Service Overview on page 318
- Call Admission Control Overview on page 324
- Configuring S-GW-Specific CAC Parameters on page 396

PART 8

# Maintenance

CHAPTER 13

# Maintenance Mode

## Mobility Maintenance Mode Overview

Junos OS maintenance mode for the MobileNext Broadband Gateway allows you to take certain network functionality offline to perform specific maintenance tasks without disrupting service. When access point names, gateways, subscribers, and the like need maintenance, entering maintenance mode prevents these mobility elements from accepting new requests. You have the option of allowing all existing services to complete, or clear them. When ready, proceed with critical maintenance functions with a minimum of service disruption. Subscribers who attempt to access a gateway that is active in maintenance mode are prompted with a notice that the service is not supported.

You must make the following changes in maintenance mode:

- Delete or modify the addresses of certain GPRS tunneling protocol (GTP) interfaces.
- Delete or change the type of an access point name (APN).
- Change mobile interface configuration parameters.
- Change a mobile interface for an APN.
- Delete a charging profile.
- Delete or modify a charging data record (CDR) profile or CDR type.
- Delete or modify a transport profile.
- Delete or modify a trigger profile.
- Delete a mobile pool or modify its parameters.

These maintenance tasks are discussed in this topic. You can perform all other maintenance tasks outside of maintenance mode.

Notice that the maintenance mode procedures listed do not include adding elements. New gateways, APNs, and such carry no traffic and thus do not need to be gracefully halted. However, you can create new mobility network elements in maintenance mode as an environment in which to test configurations before deploying them.

**Related Documentation**

- Changing a GTP Interface Address on page 407
- Deleting a GTP Interface on page 409
- Modifying an Access Point Name on page 410
- Configuring the Mobile Interface of an Access Point Name on page 412
- Deleting an Access Point Name on page 413
- Changing a Charging Profile on page 414
- Deleting a Charging Profile on page 418
- Changing a Transport Profile on page 416
- Deleting a Session PIC on page 423
- Deleting a Services PIC on page 425

- Changing AMS Interface Parameters on page 427
- Changing Gateway Parameters with Maintenance Mode on page 430


## Changing a GTP Interface Address

This procedure describes how to use maintenance mode to halt new sessions from being started and to verify that there are no active sessions remaining before making changes to a GPRS tunneling protocol (GTP) interface address.

1. Enter configuration mode in the CLI.

   user@host> **configure**

2. Activate maintenance mode for a gateway.

   user@host# **set unified-edge gateways ggsn-pgw** ***gw-name*** **service-mode maintenance"**

3. Verify that the mobility gateway is in maintenance mode.

   user@host# **run show unified-edge ggsn-pgw gateway service-mode**

   NOTE: From the gateway hierarchy, the service mode for the gateway shows Maintenance – Active Phase if all the sessions using this pool are cleared. The service mode for the gateway shows Maintenance – In Phase if there are some sessions actively using this pool.

4. Verify that there are no subscribers active on this gateway.

   user@host# **run show unified-edge ggsn-pgw subscribers gateway** ***gw-name***

   NOTE: If a large number of subscribers will use this gateway, the preceding command will be process intensive, in which case, you can use the following command:

   user@host# **run show unified-edge ggsn-pgw status**

   This command shows the active contexts across all of the gateway instances.

5. Verify that there are no outstanding CDRs for the gateway.

   user@host# **show unified-edge ggsn-pgw charging transfer status**

6. (Optional) Terminate sessions that are using the gateway and clear CDRs using the following **clear** commands:

   user@host# **run clear unified-edge ggsn-pgw subscribers gateway** ***gw-name***

   user@host# **run clear unified-edge ggsn-pgw subscribers charging gateway** ***gw-name***

CAUTION: These clear commands clear all of the existing subscribers on the gateway. Only issue these commands if you intend to disconnect service to all these subscribers.

7. When the subscriber count is zero, all sessions have ended, and the charging data records (CDRs) are flushed, modify the GTP interface in active maintenance mode.

   **user@host# set unified-edge gateways ggsn-pgw *gw-name* gtp interface *interface-name***
   **user@host# commit**

NOTE: These modifications must be made in active maintenance mode or they will fail.

8. Verify that changes were properly committed.

   **user@host# run show configuration unified-edge ggsn-pgw gateway *gw-name***

9. Exit maintenance mode and commit.

   **user@host# delete unified-edge gateways ggsn-pgw *gw-name* gateway *gw-name* service-mode**
   **user@host# commit**

10. Return the gateway to operational state.

    **user@host# run show unified-edge ggsn-pgw gateway service-mode**

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Deleting a GTP Interface on page 409
- Changing Gateway Parameters with Maintenance Mode on page 430

## Deleting a GTP Interface

This procedure describes how to use maintenance mode to delete a GPRS tunneling protocol (GTP) interface. You must first halt new sessions from being started and verify that there are no active sessions remaining.

You can use maintenance mode to remove any of the following GTP interfaces:

- Gn
- Gp
- S5
- S8

You can also enter maintenance mode to delete control and data portions of these interface configurations.

1. Enter configuration mode in the CLI.

   user@host> **configure**

2. Activate maintenance mode for a gateway.
3. Verify that the mobility gateway is in maintenance mode.

   user@host# **run show unified-edge ggsn-pgw gateway service-mode**

   NOTE: From the gateway hierarchy, the service mode for the gateway shows Maintenance – Active Phase if all the sessions using this pool are cleared. The service mode for the gateway shows Maintenance – In Phase if there are some sessions actively using this pool. The service mode for the gateway shows Maintenance – Out Phase if maintenance mode is not configured (that is, the gateway is in operational mode).

   Verify that there are no subscribers active on this gateway.

   user@host# **run show unified-edge ggsn-pgw subscriber gateway *gw-name***

4. Verify that there are no outstanding CDRs for the gateway.

   user@host# **show unified-edge ggsn-pgw charging transfer status**

5. (Optional) Terminate sessions that are using the gateway and clear CDRs using the following **clear** commands:

   user@host# **run clear unified-edge ggsn-pgw subscribers gateway *gw-name***

   user@host# **run clear unified-edge ggsn-pgw subscribers charging gateway *gw-name***

6. When the subscriber count is zero, all sessions have ended, and the charging data records (CDRs) are flushed, delete the GTP interface in active maintenance mode.

NOTE: These modifications must be made in active maintenance mode or they will fail.

7. Delete the GTP interface.

   **user@host# delete unified-edge gateways ggsn-pgw *gw-name* gtp interface *interface-name***
   **user@host# commit**

8. Exit maintenance mode and commit.

   **user@host# delete unified-edge gateways ggsn-pgw *gw-name* gateway *gw-name* service-mode**
   **user@host# commit**

9. Verify that changes were properly committed.

   **user@host# run show configuration unified-edge ggsn-pgw gateway *gw-name***

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Changing a GTP Interface Address on page 407
- Changing Gateway Parameters with Maintenance Mode on page 430

## Modifying an Access Point Name

This procedure describes how to use maintenance mode to modify an access point name (APN). Options include modifying such parameters as apn-type, mobile-interface, charging, and maximum-bearers. You must first halt new sessions from being started and verify that there are no active sessions remaining.

To change an access point name:

1. Enter configuration mode in the CLI.

   **user@host> configure**

2. Activate maintenance mode for an APN.

   **user@host# set unified-edge gateways ggsn-pgw *gw-name* apn-services apns *apn-name* service-mode maintenance**

3. Commit the command.

   **user@host# commit**

4. Verify that the APN is in maintenance mode.

   **user@host# run show unified-edge ggsn-pgw apn service-mode**

   This command displays the service-mode status for all the APNs. You can verify the status for the specific APN and take action accordingly.

NOTE: The service mode for the APN shows Maintenance – Active Phase if all the sessions using this APN are cleared. The service mode for the APN shows Maintenance - In Phase if there are some sessions actively using this APN.

5. Verify that there are no subscribers active on the APN.

   **user@host# run show unified-edge ggsn-pgw subscribers | match *apn-name***

6. (Optional) Terminate sessions on an APN using the **clear** command

   **user@host# run clear unified-edge ggsn-pgw subscribers apn *apn-name* gateway *gw-name***

7. When the subscriber count is zero and all sessions have ended, make and commit changes to the APN in active maintenance mode.

   NOTE: These modifications must be made in active maintenance mode or they will fail.

8. Modify the APN and commit the changes.
9. Exit maintenance mode.

   **user@host# delete unified-edge gateways ggsn-pgw *gw-name* apn-services apns *apn-name* service--mode**
   **user@host# commit**

10. Verify that changes were properly committed.

    **user@host# run show configuration unified-edge gateways ggsn-pgw *gw-name* apn-services apns *apn-name***

    The APN edits should appear in the show command output.

11. Return the gateway to operational state.

    **user@host# run show unified-edge ggsn-pgw gateway service-mode**

NOTE: Although maintenance mode does not explicitly include AAA options, certain AAA changes require you to place affected APNs in maintenance mode first. These changes include: changing an AAA profile name and changing authorization or accounting elements. If you attempt to make AAA changes that affect an APN that is not in maintenance mode, you are prompted to place the appropriate APN into maintenance mode before proceeding with AAA profile name or element changes.

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Configuring the Mobile Interface of an Access Point Name on page 412
- Deleting an Access Point Name on page 413

- Changing Gateway Parameters with Maintenance Mode on page 430

## Configuring the Mobile Interface of an Access Point Name

This procedure describes how to use maintenance mode to modify attributes of the mobile interface for an access point name (APN). You must first halt new sessions from being started and verify that there are no active sessions remaining.

To configure the mobile interface of an access point name:

1. Enter configuration mode in the CLI.

   user@host> **configure**

2. Activate maintenance mode for the APN using the mobile interface to be modified.

   user@host# **set unified-edge gateways ggsn-pgw *gw-name* apn-services apns *apn-name* service-mode maintenance**
   user@host# **commit**

3. Verify that the APN of this mobile interface is in maintenance mode.

   user@host# **run show unified-edge ggsn-pgw apn service-mode**

   NOTE: From the gateway hierarchy, the service mode for the gateway shows Maintenance – Active Phase if all the sessions using this APN are cleared. The service mode for the gateway shows Maintenance – In Phase if there are some sessions actively using this APN. The service mode for the APN shows Maintenance – Out Phase if maintenance mode is not configured (that is, it is in operational mode).

   NOTE: You cannot make and commit changes to a mobile interface unless the APN to which it is attached is in maintenance mode.

4. Verify that there are no subscribers active on the APN.

   user@host# **run show unified-edge ggsn-pgw subscribers | match *apn-name***

5. (Optional) Terminate sessions that are using a mobile pool using the **clear** command.

   user@host# **run clear unified-edge ggsn-pgw subscribers apn *apn-name* gateway *gw-name***

6. When the subscriber count is zero and all sessions have ended, make and commit changes to the APN mobile interface in active maintenance mode.

   NOTE: These modifications must be made in active maintenance mode or they will fail.

7. Modify the interface and commit the changes.

8. Exit maintenance mode.

   **user@host# delete unified-edge gateways ggsn-pgw *gw-name* apn-services apns *apn-name* service-mode**
   **user@host# commit**

9. Verify that changes were properly committed.

   **user@host# run show configuration unified-edge gateways ggsn-pgw *gw-name* apn-services apns *apn-name***

10. Return the gateway to operational state.

    **user@host# run show unified-edge ggsn-pgw gateway service-mode**

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Example: Changing Access Point Name Values on page 432
- Deleting an Access Point Name on page 413
- Changing Gateway Parameters with Maintenance Mode on page 430

## Deleting an Access Point Name

This procedure describes how to use maintenance mode to delete an access point name (APN). You must first halt new sessions from being started and verify that there are no active sessions remaining.

To delete an access point name:

1. Enter configuration mode in the CLI.

   **user@host> configure**

2. Activate maintenance mode for an APN.

   **user@host# set unified-edge gateways ggsn-pgw *gw-name* apn-services apn *apn-name* service-mode maintenance**
   **user@host# commit**

3. Verify that the APN is in maintenance mode.

   **user@host# run show unified-edge ggsn-pgw apn service-mode**

   NOTE: The service mode for the APN shows Maintenance – Active Phase if all the sessions using this APN are cleared. The service mode for the APN shows Maintenance – In Phase if there are some sessions actively using this APN. The service mode for the APN shows Maintenance – Out Phase if maintenance mode is not configured (that is, it is in operational mode).

4. Verify that there are no subscribers active on the APN.

   **user@host# run show unified-edge ggsn-pgw apn *apn-name* gateway *gw-name***

5. (Optional) Terminate sessions that are using an APN using the **clear** command.

```
user@host#  run clear unified-edge ggsn-pgw subscribers apn apn-name gateway
  gw-name
```

6. When the subscriber count is zero and all sessions have ended, delete the APN in active maintenance mode.

NOTE: These modifications must be made in active maintenance mode or they will fail.

7. Delete the APN and commit the changes.

```
user@host# delete unified-edge gateways ggsn-pgw  gw-name apn-services apns
  apn-name
```

8. Verify that changes were properly committed by showing the configuration for the entire unified edge to make sure the APN is deleted.
9. Return the gateway to the operational state.

```
user@host# run show unified-edge ggsn-pgw gateway service-mode
```

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Configuring the Mobile Interface of an Access Point Name on page 412
- Example: Changing Access Point Name Values on page 432
- Changing Gateway Parameters with Maintenance Mode on page 430

## Changing a Charging Profile

This procedure describes how to use maintenance mode to change a charging profile. You must first halt new sessions from being started and verify that there are no active sessions remaining.

You can make the following types of changes to the charging profile in maintenance mode:

- CDR profile
- Transport profile
- Trigger profile

To change the charging profile:

1. Enter configuration mode in the CLI.

```
user@host> configure
```

2. Activate maintenance mode for a charging profile.

```
user@host# set unified-edge gateways ggsn-pgw gw-name charging charging-profiles
  profile-name service-mode maintenance
user@host# commit
```

3. Verify that the charging gateway is in maintenance mode.

   **user@host#show unified-edge ggsn-pgw subscribers charging charging-profile *profile-name* gateway *gw-name***

   NOTE: The service mode for the charging profile shows Maintenance – Active Phase if all the sessions using this profile are cleared. The service mode for the charging profile shows Maintenance – In Phase if there are some sessions actively using this profile. The service mode for the profile shows Maintenance – Out Phase if maintenance mode is not configured (that is, it is in operational mode).

   Verify that there are no subscribers active on this charging profile.

   **user@host#show unified-edge ggsn-pgw subscribers charging charging-profile *profile-name***

4. (Optional) Terminate subscribers using a charging profile using the **clear** command.

   **user@host# run clear unified-edge ggsn-pgw subscribers charging charging-profile *profile-name* gateway *gw-name***

5. When the subscriber count is zero and all sessions have ended, you can make and commit changes to the charging profile in active maintenance mode.

   NOTE: These modifications must be made in active maintenance mode or they will fail.

6. Make the changes and verify that they were properly committed.

   **user@host# show unified-edge ggsn-pgw subscribers charging charging-profile *profile-name* gateway *gw-name***

7. Exit maintenance mode and commit to return to normal operations.

   **user@host# delete unified-edge gateways ggsn-pgw *gw-name* charging charging-profile *profile-name* service-mode**
   **user@host# commit**

8. Return the gateway to operational state.

   **user@host# run show unified-edge ggsn-pgw gateway service-mode**

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Changing a Transport Profile on page 416
- Changing a Trigger Profile on page 417
- Deleting a Charging Profile on page 418
- Changing a Call Detail Record Profile in a Charging Profile on page 420
- Changing Gateway Parameters with Maintenance Mode on page 430

## Changing a Transport Profile

This procedure describes how to use maintenance mode to change a transport profile. You must first halt new sessions from being started and verify that there are no active sessions remaining.

To change a transport profile:

1. Enter configuration mode in the CLI.

   user@host> **configure**

2. Activate maintenance mode for a charging transport profile:

   user@host# **set unified-edge gateways ggsn-pgw** ***gw-name*** **charging transport-profiles** ***profile-name*** **service-mode maintenance**
   user@host# **commit**

3. Verify that the charging gateway is in maintenance mode.

   user@host# **run show unified-edge ggsn-pgw charging service-mode transport-profile** ***profile-name*** **gateway** ***gw-name***

   NOTE: The service mode for the transport profile shows Maintenance – Active Phase if all the sessions using this profile are cleared. The service mode for a transport profile shows Maintenance – In Phase if there are some sessions actively using this profile. The service mode for the profile shows Maintenance – Out Phase if maintenance mode is not configured (that is, it is in operational mode).

4. Verify that there are no subscribers active on this charging profile.

   user@host# **run show unified-edge ggsn-pgw subscribers charging transport-profile** ***profile-name*** **gateway** ***gw-name***

5. (Optional) Terminate sessions using the **clear** command.

   user@host# **run clear unified-edge ggsn-pgw subscribers charging transport-profile** ***profile-name*** **gateway** ***gw-name***

6. When the subscriber count is zero and all sessions have ended, you can make and commit changes to the charging transport profile in active maintenance mode.

   NOTE: These modifications must be made in active maintenance mode or they will fail.

7. Modify the charging transport profile as required.

8. Exit maintenance mode and commit.

   user@host# **delete unified-edge gateways ggsn-pgw** ***gw-name*** **charging transport-profile** ***profile-name*** **service-mode commit**

9. Verify that changes were properly committed.

user@host# run show configuration unified-edge ggsn-pgw gateway *gw-name*

10. Return the gateway to operational state.

    user@host# run show unified-edge ggsn-pgw gateway service-mode

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Changing a Charging Profile on page 414
- Changing a Trigger Profile on page 417
- Deleting a Charging Profile on page 418
- Changing a Call Detail Record Profile in a Charging Profile on page 420
- Changing Gateway Parameters with Maintenance Mode on page 430

## Changing a Trigger Profile

This procedure describes how to use maintenance mode to change a trigger profile. You must first halt new sessions from being started and verify that there are no active sessions remaining.

To change a trigger profile:

1. Enter configuration mode in the CLI.

   user@host> **configure**

2. Activate maintenance mode for a charging trigger profile:

   user@host# **set unified-edge gateways ggsn-pgw *gw-name* charging trigger-profiles *profile-name* service-mode maintenance**
   user@host# **commit**

3. Verify that the charging gateway is in maintenance mode.

   user@host# **run show unified-edge ggsn-pgw charging service-mode trigger-profile *profile-name* gateway *gw-name***

   Verify that there are no subscribers active on this charging profile.

   user@host# **run show unified-edge ggsn-pgw subscribers charging trigger-profile *profile-name* gateway *gw-name***

4. (Optional) Terminate sessions using the **clear** command

   user@host# **run clear unified-edge ggsn-pgw subscribers charging trigger-profile *profile-name* gateway *gw-name***

5. When the subscriber count for the charging profile and all CDRs generated for the charging profile is zero, you can make and commit changes to the charging trigger profile in active maintenance mode.

NOTE: These modifications must be made in active maintenance mode or they will fail.

6. Modify the charging trigger profile.
7. Commit your changes and exit maintenance mode.

   user@host# **delete unified-edge gateways ggsn-pgw** *gw-name* **charging trigger-profile** *profile-name* **service-mode commit**

8. Verify that changes were properly committed.

   user@host# **run show configuration unified-edge ggsn-pgw gateway** *gw-name*

9. Return the gateway to operational state.

   user@host# **run show unified-edge ggsn-pgw gateway service-mode**

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Changing a Charging Profile on page 414
- Changing a Transport Profile on page 416
- Deleting a Charging Profile on page 418
- Changing a Call Detail Record Profile in a Charging Profile on page 420
- Changing Gateway Parameters with Maintenance Mode on page 430

## Deleting a Charging Profile

This procedure describes how to use maintenance mode to delete a charging profile. You must first halt new sessions from being started and verify that there are no active sessions remaining.

The example shown is for deleting a charging transport profile. The same configuration applies for deleting a transport or trigger profile.

NOTE: **Use this procedure to delete a charging profile or a charging transport profile. To specify a charging profile, replace the syntax charging transport-profiles with charging charging-profiles.**

To delete a charging profile:

1. Enter configuration mode in the CLI.

   user@host> **configure**

2. Activate maintenance mode for a charging transport profile:

   user@host# **set unified-edge gateways ggsn-pgw** *gw-name* **charging transport-profiles** *profile-name* **service-mode maintenance**
   **commit**

3. Verify that the charging gateway is in maintenance mode.

   user@host#**show unified-edge ggsn-pgw charging service-mode transport-profile** *profile-name* **gateway** *gw-name*

NOTE: The service mode for the charging profile shows Maintenance – Active Phase if all the sessions using this pool are cleared. The service mode for the charging profile shows Maintenance – In Phase if there are some sessions actively using this profile. The service mode for the profile shows Maintenance – Out Phase if maintenance mode is not configured (that is, it is in operational mode).

4. Verify that there are no subscribers active on this charging profile.

   **user@host#show unified-edge ggsn-pgw charging service-mode transport-profile *profile-name* gateway *gw-name***

5. (Optional) Terminate sessions that are using a charging profile using the **clear** command.

   **user@host# run clear unified-edge ggsn-pgw subscribers charging transport-profile *profile-name* gateway *gw-name***

6. When the subscriber count is zero and all sessions have ended, you can make and commit changes to charging profile attributes in active maintenance mode.

   NOTE: These modifications must be made in active maintenance mode or they will fail.

7. Delete the charging transport profile, commit your changes, and exit maintenance mode.

   **user@host# delete unified-edge gateways ggsn-pgw *gw-name* charging transport-profile *profile-name* service-mode**
   **user@host# commit**

8. Verify that changes were properly committed.

   **user@host# run show configuration unified-edge ggsn-pgw gateway *gw-name***

9. Return the gateway to operational state.

   **user@host# run show unified-edge ggsn-pgw gateway service-mode**

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Changing a Charging Profile on page 414
- Changing a Transport Profile on page 416
- Changing a Trigger Profile on page 417
- Changing a Call Detail Record Profile in a Charging Profile on page 420
- Changing Gateway Parameters with Maintenance Mode on page 430

## Changing a Call Detail Record Profile in a Charging Profile

This procedure describes how to use maintenance mode to change a CDR profile in a charging profile. You must first halt new sessions from being started and verify that there are no active sessions remaining.

To make changes to a CDR profile in a charging profile in maintenance mode:

1. Enter configuration mode in the CLI.

   **user@host> configure**

2. Place the charging profile in maintenance mode.

   **user@host# set unified-edge gateways ggsn-pgw *gw-name* charging charging-profiles *profile-name* maintenance mode**
   **user@host# commit**

3. Verify that, for this charging profile, no subscribers are active and that the CDRs have been flushed.

   **user@host# run show unified-edge ggsn-pgw *gw-name* subscribers charging charging-profile *profile-name***

4. (Optional) Terminate sessions that are using a mobile pool using the **clear** command.

   **user@host# run clear unified-edge ggsn-pgw subscribers charging charging-profile *profile-name***

5. When the subscriber count is zero and all sessions have ended, maintenance mode is active. You can make and commit changes to pool attributes in active maintenance mode.

   NOTE: **These modifications must be made in active maintenance mode or they will fail.**

6. Make the changes and verify that they were properly committed.

   **user@host# run show unified-edge ggsn-pgw subscribers charging charging-profile *profile-name* gateway *gw-name* charging charging-profile *profile-name***

7. Commit your changes and exit maintenance mode to return to normal operations.

   **user@host# delete unified-edge gateways ggsn-pgw *gw-name* charging charging-profile *profile-name* service-mode**
   **user@host# commit**

8. Return the gateway to operational state.

   **user@host# run show unified-edge ggsn-pgw gateway service-mode**

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Changing a Charging Profile on page 414
- Changing a Transport Profile on page 416

- Changing a Trigger Profile on page 417
- Deleting a Charging Profile on page 418
- Changing Gateway Parameters with Maintenance Mode on page 430


## Changing Address Attributes in the Mobile Address Pool

This procedure describes how to place a mobile pool of a virtual routing and forwarding (VRF) instance in maintenance mode, allow all existing sessions using this pool to gracefully terminate, and then delete or modify pool attributes (for example, change address ranges in a pool).

To change address attributes in the mobile address pool:

1. Enter configuration mode in the CLI.

   user@host> **configure**

2. Activate maintenance mode for a mobile pool.

   user@host# **configure**
   user@host# **set routing-instance *vrf-name* access address-assignment mobile pools *juniper-pool* service-mode maintenance**
   user@host# **commit**

3. Verify that all subscriber sessions have ended.

   user@host# **run show unified-edge ggsn-pgw address-assignment pool brief**

   NOTE: The service mode shows Maintenance – Active Phase if all the sessions are cleared. The service mode shows Maintenance – In Phase if there are some sessions active. The service mode shows Maintenance – Out Phase if maintenance mode is not configured (that is, it is in operational mode).

4. (Optional) Terminate existing sessions using the **clear** command.

   user@host# **configure**
   user@host# **run clear unified-edge ggsn-pgw subscribers routing-instance *juniper-vrf***

   NOTE: When the subscriber count is zero and all sessions have terminated, the service mode status indicates Maintenance – Active phase. In this state, you can modify mobile pool attributes and commit changes.

5. Make changes to the pool and commit.

6. Verify that changes were properly committed.

   user@host# **run show configuration routing-instance access address-assignment mobile-pools pool-name detail**

NOTE: These modifications, if made outside of active maintenance mode, will fail.

7. Exit maintenance mode to return to normal operational mode.

   user@host# **delete routing-instance *juniper-vrf* access address-assignment mobile-pools *pool-name* service-mode**
   user@host# **commit**

8. Return the gateway to operational state.

   user@host# **run show unified-edge ggsn-pgw gateway service-mode**

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Deleting a Mobile Address Pool on page 422

## Deleting a Mobile Address Pool

This procedure describes how to delete a mobile pool. You must first halt new sessions from being started and verify that there are no active sessions remaining. The steps are similar to those described in "Changing Address Attributes in the Mobile Address Pool" on page 421

To delete an address from an address pool:

1. Enter configuration mode in the CLI.

   user@host> **configure**

2. Activate maintenance mode for a mobile pool.

   user@host# **set routing-instance *juniper-vrf* access address-assignment mobile-pools *pool-name* service-mode maintenance**
   **commit**

3. Verify that all subscriber sessions have ended.

   user@host# **run show unified-edge ggsn-pgw address-assignment pool brief**

   NOTE: The service mode shows Maintenance – Active Phase if all the sessions are cleared. The service mode shows Maintenance – In Phase if there are some sessions active. The service mode shows Maintenance – Out Phase if maintenance mode is not configured (that is, it is in operational mode).

4. (Optional) Terminate sessions that are using a mobile pool using the **clear** command.

   user@host# **configure**
   user@host# **run clear unified-edge ggsn-pgw subscribers routing-instance *juniper-vrf***

NOTE: When the subscriber count is zero and all sessions have terminated, the service mode status will indicate “Maintenance – Active phase.” In this state, you can modify pool attributes and commit changes.

5. For this pool, when the subscriber count is zero and all sessions have ended, the service mode status indicates “Maintenance – Active Phase.” In this state, you can modify mobile pool attributes and commit changes.

NOTE: These modifications, if made outside of active maintenance mode, will fail.

6. Delete the address pool and commit the change.

```
user@host# delete routing-instance juniper-vrf access address-assignment
  mobile-pools juniper-pool
commit
```

7. Verify that the address pool has been deleted (that is, it is not listed in the output).

```
user@host# run show configuration routing-instance juniper-vrf access
  address-assignment mobile-pools juniper-pool
user@host#  commit
```

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Changing Address Attributes in the Mobile Address Pool on page 421

## Deleting a Session PIC

This procedure shows how to delete a session PIC using maintenance mode at the **[edit unified-edge gateways ggsn-pgw *ggsn-pgw-name* system session-pics interface]** or **[edit unified-edge gateways sgw *sgw-name* system session-pics interface]** hierarchy level. The session PIC can be an aggregated multiservices interface (AMS). Session PICs process control plane messages on a broadband gateway.

Before you delete a session PIC using maintenance mode:

- Make sure that this change has been coordinated with affected groups and users.

To configure maintenance mode and session PIC deletion:

1. Verify the current status of maintenance mode for this session PIC.

```
user@host> show unified-edge ggsn-pgw gateway-name system interfaces
  service-mode
user@host> show unified-edge sgw gateway-name system interfaces service-mode
```

NOTE: The service-mode option displays the information details about maintenance mode as well as status.

```
Maintenance Mode
  MM Active Phase - System is ready to accept configuration changes for all
        attributes of this object and its sub-hierarchies.
  MM In/Out Phase - System is ready to accept configuration changes only for
        non-maintenance mode attributes of this object and
        its sub-hierarchies.

Interface Name  Gateway Name  Service Mode
ms-1/0/0  MBG1  Operational
ms-1/1/0  MBG1  Operational
ms-2/0/0  MBG1  Operational
ms-2/1/0  MBG1  Operational
pfe-0/0/0  MBG1  Operational
pfe-0/1/0  MBG1  Operational
pfe-0/2/0  MBG1  Operational
pfe-0/3/0  MBG1  Operational
ams1  MBG1  Operational
```

2. Place the broadband gateway in configuration mode.

   **user@host# configure**

3. On the Gateway GPRS Support Node (GGSN). Packet Data Network Gateway (P-GW), or Serving Gateway (S-GW), place the interface in maintenance mode.

   **user@host# set unified-edge gateways ggsn-pgw *gateway-name* system session-pics interface *interface-name* service-mode maintenance**
   **user@host# set unified-edge gateways sgw *gateway-name* system session-pics interface *interface-name* service-mode maintenance**

4. Commit maintenance mode.

   **user@host# commit**

5. Verify that the session PIC is in active maintenance mode where configuration changes will be accepted for this object and all of its subhierarchies.

   **user@MGB1> show unified-edge ggsn-pgw *gateway-name* system interfaces service-mode**
   **user@MGB1> show unified-edge sgw *gateway-name* system interfaces service-mode**

```
Maintenance Mode
  MM Active Phase - System is ready to accept configuration changes for all
        attributes of this object and its sub-hierarchies.
  MM In/Out Phase - System is ready to accept configuration changes only for
        non-maintenance mode attributes of this object and
        its sub-hierarchies.

Interface Name  Gateway Name  Service Mode
ms-1/0/0  MBG1  Operational
ms-1/1/0  MBG1  Maintenance - Active Phase
ms-2/0/0  MBG1  Operational
ms-2/1/0  MBG1  Operational
pfe-0/0/0  MBG1  Operational
pfe-0/1/0  MBG1  Operational
pfe-0/2/0  MBG1  Operational
```

```
pfe-0/3/0  MBG1  Operational
ams1  MBG1  Operational
```

NOTE: All subscribers serviced by the session PIC must go to zero. All Charging Data Records (CDRs) for these subscribers must be flushed out. You can wait for these conditions to be met, or use the clear command for the interface (or gateway) to force these conditions.

6. Delete the session PIC.

   user@host# **delete unified-edge gateways ggsn-pgw** ***gateway-name*** **system interface** ***interface-name***
   user@host# **delete unified-edge gateways sgw** ***gateway-name*** **system interface** ***interface-name***

7. Exit with commit.

   NOTE: Deletion of a session PIC automatically exits maintenance mode for the deleted PIC.

   user@host# **commit**

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Deleting a Services PIC on page 425
- Changing AMS Interface Parameters on page 427
- Changing Gateway Parameters with Maintenance Mode on page 430

## Deleting a Services PIC

This procedure shows how to delete a services PIC using maintenance mode at the **[edit unified-edge gateways ggsn-pgw** ***ggsn-pgw-name*** **system session-pics interface]** or **[edit unified-edge gateways sgw** ***sgw-name*** **system session-pics interface]** hierarchy level. The services PIC can be an aggregated multiservices interface (AMS). Services PICs perform packet-related services on a broadband gateway.

Before you delete a services PIC using maintenance mode:

- Make sure that this change has been coordinated with affected groups and users.

To configure maintenance mode and services PIC deletion:

1. Verify the current status of maintenance mode for this services PIC.

   user@host> **show unified-edge ggsn-pgw** ***gateway-name*** **system interfaces service-mode**
   user@host> **show unified-edge sgw** ***gateway-name*** **system interfaces service-mode**

NOTE: The service-mode option displays the information details about maintenance mode as well as status.

```
Maintenance Mode
  MM Active Phase - System is ready to accept configuration changes for all
        attributes of this object and its sub-hierarchies.
  MM In/Out Phase - System is ready to accept configuration changes only for
        non-maintenance mode attributes of this object and
        its sub-hierarchies.

Interface Name  Gateway Name  Service Mode
ms-1/0/0  MBG1   Operational
ms-1/1/0  MBG1   Operational
ms-2/0/0  MBG1   Operational
ms-2/1/0  MBG1   Operational
pfe-0/0/0  MBG1   Operational
pfe-0/1/0  MBG1   Operational
pfe-0/2/0  MBG1   Operational
pfe-0/3/0  MBG1   Operational
ams1   MBG1   Operational
```

2. Place the broadband gateway in configuration mode.

   **user@host# configure**

3. On the Gateway GPRS Support Node (GGSN). Packet Data Network Gateway (P-GW), or Serving Gateway (S-GW), place the interface in maintenance mode.

   **user@host# set unified-edge gateways ggsn-pgw *gateway-name* system session-pics interface *interface-name* service-mode maintenance**
   **user@host# set unified-edge gateways sgw *gateway-name* system session-pics interface *interface-name* service-mode maintenance**

4. Commit maintenance mode.

   **user@host# commit**

5. Verify that the services PIC is in active maintenance mode where configuration changes will be accepted for this object and all of its subhierarchies.

   **user@MGB1> show unified-edge ggsn-pgw *gateway-name* system interfaces service-mode**
   **user@MGB1> show unified-edge sgw *gateway-name* system interfaces service-mode**

```
Maintenance Mode
  MM Active Phase - System is ready to accept configuration changes for all
        attributes of this object and its sub-hierarchies.
  MM In/Out Phase - System is ready to accept configuration changes only for
        non-maintenance mode attributes of this object and
        its sub-hierarchies.

Interface Name  Gateway Name  Service Mode
ms-1/0/0  MBG1   Operational
ms-1/1/0  MBG1   Operational
ms-2/0/0  MBG1   Maintenance - Active Phase
```

```
ms-2/1/0  MBG1   Operational
pfe-0/0/0  MBG1   Operational
pfe-0/1/0  MBG1   Operational
pfe-0/2/0  MBG1   Operational
pfe-0/3/0  MBG1   Operational
ams1   MBG1   Operational
```

NOTE: All subscribers serviced by the services PIC must go to zero. All Charging Data Records (CDRs) for these subscribers must be flushed out. You can wait for these conditions to be met, or use the clear command for the interface (or gateway) to force these conditions.

6. Delete the services PIC.

   user@host# **delete unified-edge gateways ggsn-pgw** *gateway-name* **system interface** *interface-name*
   user@host# **delete unified-edge gateways sgw** *gateway-name* **system interface** *interface-name*

7. Exit maintenance mode and commit.

NOTE: Deletion of a services PIC automatically exits maintenance mode for the deleted PIC.

```
user@host# commit
```

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Deleting a Session PIC on page 423
- Changing AMS Interface Parameters on page 427
- Changing Gateway Parameters with Maintenance Mode on page 430

## Changing AMS Interface Parameters

This procedure shows how to change the parameters for an aggregated multiservices (AMS) interface on a MobileNext Broadband Gateway using maintenance mode at the **[edit interfaces]** hierarchy level. If an AMS interface is configured under a gateway's session PICs or services PICs, and there is a change to any load-balancing options such as membership of AMS interfaces (**mams-**), then the AMS interface must be in maintenance mode.

Before you change AMS parameters using maintenance mode:

- Make sure that this change has been coordinated with affected groups and users.

To configure maintenance mode and AMS parameter change:

1. Verify the current status of maintenance mode for the AMS.

```
user@MGB1> show unified-edge ggsn-pgw gateway-name system interfaces
  service-mode
```

NOTE: The service-mode option displays the information details about maintenance mode as well as status.

```
Maintenance Mode
  MM Active Phase - System is ready to accept configuration changes for all
        attributes of this object and its sub-hierarchies.
  MM In/Out Phase - System is ready to accept configuration changes only for
        non-maintenance mode attributes of this object and
        its sub-hierarchies.

Interface Name  Gateway Name  Service Mode
ms-1/0/0   MBG1   Operational
ms-1/1/0   MBG1   Operational
ms-2/0/0   MBG1   Operational
ms-2/1/0   MBG1   Operational
pfe-0/0/0   MBG1   Operational
pfe-0/1/0   MBG1   Operational
pfe-0/2/0   MBG1   Operational
pfe-0/3/0   MBG1   Operational
ams1   MBG1   Operational
```

2. Place the broadband gateway in configuration mode.

```
user@host# configure
```

3. Show the current configuration for the AMS interface

```
user@host# show interfaces interface-name
load-balancing-options {
  member-interface mams-4/1/0;
  member-interface mams-5/1/0;
  member-failure-options {
    redistribute-all-traffic {
      enable-rejoin;
    }
  }
  high-availability-options {
    many-to-one {
      preferred-backup mams-5/1/0;
    }
  }
}
unit 1 {
  family inet;
}
unit 2 {
  family inet;
}
```

4. On the gateway, place the interface in maintenance mode.

user@host# set unified-edge ggsn-pgw *gateway-name* system interface *interface-name* service-mode maintenance

NOTE: This is done at the [edit unified-edge] hierarchy level.

5. Commit maintenance mode.

   user@host# commit

6. Verify that the AMS interface is in active maintenance mode where configuration changes will be accepted for this object and all of its subhierarchies.

   user@MGB1> show unified-edge ggsn-pgw *gateway-name* system interfaces service-mode

   Maintenance Mode
   MM Active Phase - System is ready to accept configuration changes for all attributes of this object and its sub-hierarchies.
   MM In/Out Phase - System is ready to accept configuration changes only for non-maintenance mode attributes of this object and its sub-hierarchies.

   Interface Name Gateway Name Service Mode
   ms-1/0/0 MBG1 Operational
   ms-1/1/0 MBG1 Operational
   ms-2/0/0 MBG1 Operational
   ms-2/1/0 MBG1 Operational
   pfe-0/0/0 MBG1 Operational
   pfe-0/1/0 MBG1 Operational
   pfe-0/2/0 MBG1 Operational
   pfe-0/3/0 MBG1 Operational
   ams1 MBG1 Maintenance - Active Phase

NOTE: All subscribers serviced by the AMS interface must go to zero. All Charging Data Records (CDRs) for these subscribers must be flushed out. You can wait for these conditions to be met, or use the clear command for the interface (or gateway) to force these conditions.

7. Delete or change AMS member interfaces and parameters.

   user@MGB1> show unified-edge ggsn-pgw *gateway-name* system interfaces service-mode
   user@host# delete unified-edge ggsn-pgw *gateway-name* system interface *interface-name* load-balancing-options member-interface *mams-interface-name*
   user@host# set interfaces *interface-name* load-balancing-options member-interface *mams-interface-name*
   user@host# delete interfaces *interface-name* load-balancing-options high-availability-options many-to-one preferred-backup *mams-interface-name*
   user@host# set interfaces *interface-name* load-balancing-options high-availability-options many-to-one preferred-backup *mams-interface-name*

NOTE: This procedure requires operations at the **[edit unified-edge]** and **[edit interfaces]** hierarchy level. Be careful!

8. Exit maintenance mode and commit.

```
user@host# delete unified-edge ggsn-pgw gateway-name system interface
  interface-name service-mode maintenance
user@host# commit
```

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Deleting a Session PIC on page 423
- Deleting a Services PIC on page 425
- Changing Gateway Parameters with Maintenance Mode on page 430

## Changing Gateway Parameters with Maintenance Mode

This procedure shows how to change the parameters for a General GPRS Support Node (GGSN), Packet Data Network Gateway (P-GW), or Service Gateway (S-GW) configured on a MobileNext Broadband Gateway using maintenance mode at the **[edit unified-edge gateways ggsn-pgw *gateway-name*]** (GGSN or P-GW) or **[edit unified-edge gateways sgw *gateway-name*]** (S-GW) hierarchy level.

The gateway must be in maintenance mode to change:

- Maximum number of bearers (GGSN, P-GW, or S-GW)
- Maximum number of network-behind-the-mobile (NBM) IPv4 prefixes for an anchor Packet Forwarding Engine (GGSN or P-GW)
- Maximum number of network-behind-the-mobile (NBM) IPv6 prefixes for an anchor Packet Forwarding Engine (GGSN or P-GW)
- Guaranteed bandwidth for each anchor Packet Forwarding Engine (S-GW)
- Maximum number of default bearers allowed (as a percentage of total bearers) on each anchor Packet Forwarding Engine (S-GW)
- Maximum number of bearers allowed on each anchor Packet Forwarding Engine (S-GW)

Before you change these gateway parameters using maintenance mode:

- Make sure that this change has been coordinated with affected groups and users.
- Make sure that this change will be applied to the correct gateway type and name.

To configure maintenance mode for a gateway parameter change:

1. Verify the current status of maintenance mode for the gateway. Under normal operating conditions, the service mode is **Operational** (that is, not in maintenance mode).

   user@host> **show unified-edge ggsn-pgw *gateway-name* service-mode**
   user@host> **show unified-edge sgw *gateway-name* service-mode**

   NOTE: The service-mode option displays the information details about maintenance mode as well as status.

   ```
   Maintenance Mode
     MM Active Phase - System is ready to accept configuration changes for all
           attributes of this object and its sub-hierarchies.
     MM In/Out Phase - System is ready to accept configuration changes only for
           non-maintenance mode attributes of this object and
           its sub-hierarchies.

   Gateway Name  Service Mode

   <gateway-name> Operational
   ```

2. Place the broadband gateway in configuration mode.

   user@host# **configure**

3. Place the gateway in maintenance mode.

   user@host# **set unified-edge ggsn-pgw *gateway-name* service-mode maintenance**
   user@host# **set unified-edge sgw *gateway-name* service-mode maintenance**

4. Commit maintenance mode.

   user@host# **commit**

5. Verify that the gateway is in active maintenance mode where configuration changes will be accepted for this object.

   user@host> **show unified-edge ggsn-pgw *gateway-name* service-mode**
   user@host> **show unified-edge sgw *gateway-name* service-mode**

   NOTE: The service-mode option displays the information details about maintenance mode as well as status.

   ```
   Maintenance Mode
     MM Active Phase - System is ready to accept configuration changes for all
           attributes of this object and its sub-hierarchies.
     MM In/Out Phase - System is ready to accept configuration changes only for
           non-maintenance mode attributes of this object and
           its sub-hierarchies.

   Gateway Name  Service Mode
   ```

<gateway-name> Maintenance - Active Phase

NOTE: All subscribers serviced by the gateway must go to zero. All Charging Data Records (CDRs) for these subscribers must be flushed out. You can wait for these conditions to be met, or use the clear command for the gateway to force these conditions.

6. Set the new parameter values.

```
user@host# set unified-edge ggsn-pgw gateway-name maximum-bearers
  maximum-bearers-value
user@host# set unified-edge sgw gateway-name maximum-bearers
  maximum-bearers-value

user@host# set unified-edge ggsn-pgw gateway-name anchor-pfe-ipv4-nbm-prefixes
  maximum-ipv4-prefixes

user@host# set unified-edge ggsn-pgw gateway-name anchor-pfe-ipv6-nbm-prefixes
  maximum-ipv4-prefixes

user@host# set unified-edge sgw gateway-name anchor-pfe-guaranteed-bandwidth
  anchor-pfe-guaranteed-bandwidth-value

user@host# set unified-edge sgw gateway-name
  anchor-pfe-default-bandwidth-percentage
  anchor-pfe-default-bandwidth-percentage-value

user@host# set unified-edge sgw gateway-name anchor-pfe-maximum-bearers
  maximum-bearers-value
```

7. Exit maintenance mode and commit.

```
user@host# delete unified-edge ggsn-pgw gateway-name service-mode maintenance
user@host# delete unified-edge sgw gateway-name service-mode maintenance
user@host# commit
```

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Deleting a Session PIC on page 423
- Deleting a Services PIC on page 425
- Changing AMS Interface Parameters on page 427

## Example: Changing Access Point Name Values

- Requirements on page 433
- Overview on page 433
- Configuration on page 433

## Requirements

This example uses the following hardware and software components:

- An operational MX Series chassis
- Junos OS MobileNext Broadband Gateway package

## Overview

The following configuration example shows how to change an access point name (APN).

## Configuration

**Step-by-Step Procedure**

To change an APN configuration:

1. Verify the current status of maintenance mode for this APN profile.

   **user@host# run show unified-edge ggsn-pgw MBG1 apn-services apn Central service-mode**

   ```
   Profile  Name   : Central
   Service Mode   : Operational
   ```

2. Place the MX Series router in configuration mode.

   **user@host# configure**

3. On the MBG1 gateway, place the APN named Central in maintenance mode.

   **user@host# set unified-edge gateways ggsn-pgw MBG1 apn-services apns Central service-mode maintenance**

4. Commit maintenance mode.

   **user@host# commit**

5. Verify that the APN profile is in active maintenance mode where configuration changes are accepted for this object and all of its subhierarchies.

   **user@host# run show unified-edge ggsn-pgw MBG1 apn-services apns Central service-mode**

   ```
   Gateway Name   : MBG1
   ...
   Profile Name      : Service Mode
   Central           : Maintenance - Active Phase
   ```

6. Commit your changes and exit maintenance mode.

   **user@host# delete unified-edge gateways ggsn-pgw MBG1 apn-service apns Central service-mode**
   **user@host#  commit**

7. Return the gateway to operational state.

   **user@host# run show unified-edge ggsn-pgw gateway service-mode**

**Results** The APN profile is placed in active maintenance mode. You can change profile attributes and commit them.

**Related Documentation**
- Mobility Maintenance Mode Overview on page 406
- Modifying an Access Point Name on page 410

## Example: Deleting an APN



### Requirements

This example uses the following hardware and software components:

- An operational MX Series chassis
- Junos OS MobileNext Broadband Gateway package

### Overview

This configuration example shows how to delete an access point name (APN).

### Configuration

**Step-by-Step Procedure** To delete an APN:

1. Enter configuration mode and place the APN named Central in maintenance mode.

```
user@host# configure
user@host# set unified-edge gateways ggsn-pgw MBG1 apn-service apns Central
  service-mode maintenance
user@host# commit
```

2. Wait for all sessions using Central to terminate. Do this by monitoring the service-mode status using the following show command. When sessions become zero, the service-mode status displays Maintenance – Active Phase.

```
user@host# run show unified-edge ggsn-pgw subscribers | match apn-name
```

NOTE: When maintenance mode shows Maintenance – Active Phase, the system is ready to accept configuration changes for all attributes of this object and its subhierarchies. When maintenance mode shows In/Out Phase, the system is ready to accept configuration changes only for non-maintenance mode attributes of this object and its subhierarchies.

3. Delete the APN named Central and commit the changes.

```
user@host# delete unified-edge ggsn-pgw MBG1 apn-services apnsCentral
user@host# commit
```

4. Exit maintenance mode and commit.

```
user@host#  delete unified-edge ggsn-pgw MBG1 apn-services apns Central
  service-mode
user@host# commit
```

5. Verify that the APN has been deleted.

```
user@host#  run show configuration unified-edge gateways ggsn-pgw MBG1
  apn-services apns
```

The APN named Central should not be displayed in the show command output.

6. Return the gateway to operational state.

```
user@host# run show unified-edge ggsn-pgw gateway service-mode
```

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Deleting an Access Point Name on page 413

## Example: Changing a Charging Profile

This example shows how to change a charging profile using maintenance mode.



### Requirements

This example uses the following hardware and software components:

- An installed and operational MX Series chassis
- Junos OS MobileNext Broadband Gateway package

### Overview

This configuration example shows how to place the charging profile named *juniper* in maintenance mode . Once in Maintenance mode, you can make changes to charging profile attributes without affecting mobility subscribers using other charging profiles.

### Configuration

**Step-by-Step Procedure**

To change a charging profile:

1. Verify the current status of maintenance mode for this charging profile.

```
user@host> show unified-edge ggsn-pgw charging service-mode gateway MBG1
  charging-profile juniper detail Service Mode Status
```

```
Gateway Name    : MBG1
...
Profile Name    : juniper
Service Mode    : Operational
```

2. Place the MX Series router in configuration mode.

   **user@host# configure**

3. On the gateway MBG1, place the charging profile named juniper in maintenance mode.

   **user@host# set unified-edge gateways ggsn-pgw MBG1 charging charging-profiles juniper service-mode maintenance**

4. Commit maintenance mode.

   **user@host# commit**

5. Verify that the charging profile is in active maintenance mode where configuration changes will be accepted for this object and all of its subhierarchies.

   **user@host# run show unified-edge ggsn-pgw charging service-mode gateway MBG1 charging-profile juniper detail Service Mode Status**

```
Gateway Name    : MBG1
 ...
Profile Name      : Service Mode
juniper           : Maintenance - Active Phase
```

6. Exit maintenance mode and commit.

   **user@host# delete unified-edge gateways ggsn-pgw charging service-mode gateway MBG1 charging-profile juniper service-mode**
   **user@host# commit**

7. Return the gateway to operational state.

   **user@host# run show unified-edge ggsn-pgw gateway service-mode**

**Results** The charging profile is in active maintenance mode. You can change profile attributes and commit them.

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Changing a Charging Profile on page 414

## Example: Changing a Transport Profile

This example shows how to change a transport profile using maintenance mode.

- Requirements on page 437
- Overview on page 437
- Configuration on page 437

## Requirements

This example uses the following hardware and software components:

- An installed and operational MX Series chassis
- Junos OS MobileNext Broadband Gateway package

## Overview

This configuration example shows how to put the transport profile “trans_p” in maintenance mode. Once in maintenance mode, you can make changes to transport profile attributes without affecting mobility subscribers using other transport profiles.

## Configuration

**Step-by-Step Procedure**

To modify a transport profile:

1. Verify the current status of maintenance mode for this transport profile.

   ```
   user@host> show unified-edge ggsn-pgw charging service-mode gateway MBG1
     transport-profile trans_p detail Service Mode Status


                Gateway Name    : MBG1
                ...
                Profile Name    : trans_p
                Service Mode    : Operational
   ```

2. Set the MX Series router in configuration mode.

   ```
   user@host# configure
   ```

3. On the gateway MBG1, place the transport profile “trans_p” in maintenance mode.

   ```
   user@host# set unified-edge gateways ggsn-pgw MBG1 charging transport-profiles
     trans_p service-mode maintenance
   ```

4. Commit maintenance mode.

   ```
   user@host# commit
   ```

5. Verify that the transport profile is in active maintenance mode where configuration changes will be accepted for this object and all of its subhierarchies.

   ```
   user@host# run show unified-edge ggsn-pgw charging service-mode gateway MBG1
     transport-profile trans_p brief maintenance mode


                Gateway Name    : MBG1
                ...
                Profile Name      : Service Mode
                trans_p           : Maintenance - Active Phase
   ```

6. Exit maintenance mode and commit.

   ```
   user@host# delete unified-edge gateways ggsn-pgw charging service-mode gateway
     MBG1 transport-profile trans_p service-mode
   user@host#  commit
   ```

7. Return the gateway to operational state.

```
user@host# run show unified-edge ggsn-pgw gateway service-mode
```

**Results** The transport profile is in active maintenance mode. You can change profile attributes and commit them.

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Changing a Transport Profile on page 416

## Example: Changing Mobility Pool Attributes



### Requirements

This example uses the following hardware and software components:

- An operational MX Series chassis
- Junos OS MobileNext Broadband Gateway package

### Overview

This example shows how to change mobility pool attributes for a mobile pool named “juniper-pool” in a routing instance named “default.”

### Configuration

**Step-by-Step Procedure** To change the address range for a mobility pool.

1. Verify the current configuration of the mobility pool.

```
user@host# run show configuration access address-assignment mobile-pools
  juniper-pool {
    family inet {
      network {
        30.30.0.0/16 {
          range {
            range1 {
              low 30.30.1.1;
              high 30.30.255.254;
}
          }
        }
      }
    }
    default-pool;
}
```

2. Enter configuration mode and then maintenance mode.

```
user@host# configure
user@host# set access address-assignment mobile-pools juniper-pool service-mode
  maintenance
user@host# commit
```

3. Wait for all sessions using juniper-pool to terminate. Do this by monitoring the service-mode status using the following show command. When the number of sessions becomes zero, the service-mode status displays “Maintenance – Active Phase.”

```
user@host# show access address-assignment mobile-pools pool-name
  service-mode
```

NOTE: “Maintenance - Active Phase” means system is ready to accept configuration changes for all attributes of this object and its subhierarchies. “Maintenance mode - In/Out Phase” means that the system is ready to accept configuration changes only for non-maintenance mode attributes of this object and its subhierarchies.

4. Change the address range from 30.30.x.x to 30.31.x.x.

```
user@host#  configure
user@host#  set access address-assignment mobile-pools juniper-pool family inet
  network 30.31.0.0/16 range range1 low 30.31.1.1 high 30.31.255.254
user@host#  configure
user@host#  delete access address-assignment mobile-pools juniper-pool family
  inet network 30.30.0.0/16
user@host#  configure
user@host# commit
```

5. Check the state of this pool.

```
user@host# run show unified-edge ggsn-pgw address-assignment pool name
  juniper-pool detail
```

6. Change the pool service mode to operational. Do this by deleting service-mode maintenance for juniper-pool.

```
user@host#  configure
user@host#  delete access address-assignment mobile-pools juniper-pool
  service-mode maintenance
user@host#  commit
```

7. Check the state of juniper-pool.

```
user@host# run show unified-edge ggsn-pgw address-assignment pool juniper-pool
  details
```

8. Check the new configuration for juniper-pool.

```
user@host# run show configuration access address-assignment mobile-pools
  juniper-pool
juniper-pool {
    family inet {
```

```
    network {
      30.31.0.0/16 {
        range {
          range1 {
            low 30.31.1.1;
            high 30.31.255.254;
          }
        }
      }
    }
  }
  default-pool;
```

**Step-by-Step Procedure**

The following examples illustrate how to make changes to mobile pools.

1. Verify the current configuration of “Gi-vrf”.

```
user@host# run show routing-instances Gi-vrf access

address-assignment {
  mobile-pools {
    v4-vrf-1 {
      family inet {
        network {
          30.30.0.0/16 {
            range {
              range1 {
                low 30.30.1.1;
                high 30.30.254.254;
              }
            }
          }
        }
      }
    }
    v6-vrf-1 {
      family inet6 {
        network {
          2000:1:2::0/48 {
            range {
              range6-1 {
                low 2000:1:2:5::0/64;
                high 2000:1:2:ffff::0/64;
              }
            }
          }
        }
      }
    }
  }
}
```

2. Enter maintenance mode to make changes to *v4-vrf-1*. In this example, you are changing the range for the pool.

```
user@host# set routing-instances Gi-vrf access address-assignment mobile-pools
  v4-vrf-1 service-mode maintenance
user@host# commit
user@host# set routing-instances Gi-vrf access address-assignment mobile-pools
  v4-vrf-1 family inet network 30.30.0.0/16 range range1 low 30.30.2.1
user@host# commit
user@host# delete routing-instances Gi-vrf access address-assignment mobile-pools
  v4-vrf-1 service-mode
user@host# commit
```

3. Verify your changes.

```
user@host# show routing-instances Gi-vrf access

  address-assignment {
    mobile-pools {
      v4-vrf-1 {
        family inet {
          network {
            30.30.0.0/16 {
              range {
                range1 {
                  low 30.30.2.1;
                  high 30.30.254.254;
                }
              }
            }
          }
        }
      }
      v6-vrf-1 {
        family inet6 {
          network {
            2000:1:2::0/48 {
              range {
                range6-1 {
                  low 2000:1:2:5::0/64;
                  high 2000:1:2:ffff::0/64;
                }
              }
            }
          }
        }
      }
    }
  }

  [edit]
  user@host#
```

**Step-by-Step Procedure**

This procedure describes how to add a network to a mobile pool.

1. Verify the current address assignment for the mobile pool “jnpr”.

```
user@host#  run show access address-assignment mobile-pools jnpr
```

```
family inet {
  network {
    30.30.0.0/16 {
      range {
        r1 {
          low 30.30.1.1;
          high 30.30.1.254;
        }
      }
    }
  }
}
default-pool;
```

2. Place the mobile pool in maintenance mode.

```
user@host# set access address-assignment mobile-pools jnpr service-mode
  maintenance
user@host# commit
```

3. Verify that the pool is in maintenance mode.

```
user@host# show access address-assignment mobile-pools jnpr

service-mode maintenance;
family inet {
  network {
    30.30.0.0/16 {
      range {
        r1 {
          low 30.30.1.1;
          high 30.30.1.254;
        }
      }
    }
  }
}
default-pool;
```

4. Add the network “10.10.0.0/16”.

```
user@host# set access address-assignment mobile-pools jnpr family inet network
  40.40.0.0/16
user@host# commit
```

5. Verify that the network was added to the pool.

```
user@host# run show access address-assignment mobile-pools jnpr

service-mode maintenance;
family inet {
  network {
    30.30.0.0/16 {
      range {
        r1 {
          low 30.30.1.1;
          high 30.30.1.254;
        }
```

```
        }
      }
      10.10.0.0/16; <----
    }
  }
  default-pool;
```

6. Exit maintenance mode and commit.

```
user@host# delete access address-assignment mobile-pools jnpr service-mode
user@host# commit
```

7. Verify that the pool is no longer in maintenance mode.

```
user@host# run show access address-assignment mobile-pools jnpr

family inet {
  network {
    30.30.0.0/16 {
      range {
        r1 {
          low 30.30.1.1;
          high 30.30.1.254;
        }
      }
    }
    10.10.0.0/16; <----
  }
}
default-pool;
```

8. Return the gateway to operational state.

```
user@host# run show unified-edge ggsn-pgw gateway service-mode
```

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Changing Address Attributes in the Mobile Address Pool on page 421

## Example: Deleting a Mobility Address Pool



### Requirements

This example uses the following hardware and software components:

- An operational MX Series chassis
- Junos OS MobileNext Broadband Gateway package

## Example of Deleting a Mobility Address Pool

In this example, a pool “juniper-pool” in routing-instance “default” exists with the following configuration:

```
juniper-pool {
  family inet {
    network {
      30.30.0.0/16 {
        range {
          range1 {
            low 30.30.1.1;
            high 30.30.255.254;
          }
        }
      }
    }
  }
  default-pool;
}
```

In this example, you delete this pool.

## Configuration

**Step-by-Step Procedure**

To delete the pool, execute the following steps.

1. Enter configuration mode and place the pool in maintenance mode.

   ```
   user@host# configure
   user@host# set access address-assignment mobile-pools juniper-pool service-mode
     maintenance
   user@host# commit
   ```

2. Wait for all sessions using “juniper-pool” to terminate. Do this by monitoring the service-mode status using the show command. When sessions become zero, the service-mode status will display Maintenance – Active Phase.

   ```
   user@host# run show unified-edge ggsn-pgw address-assignment service-mode
     pool juniper-pool
   ```

   NOTE: When maintenance mode shows “Maintenance – Active Phase,” the system is ready to accept configuration changes for all attributes of this object and its subhierarchies. When maintenance mode shows “In/Out Phase,” the system is ready to accept configuration changes only for non-maintenance mode attributes of this object and its subhierarchies.

3. Remove all references to the pool from all APNs, if any.

   ```
   user@host# delete unified-edge gateways ggsn-pgw MBG1 apn-services apn internet
     address-assignment inet-pool pool juniper-pool
   user@host# commit
   ```

4. Remove all references to the pool from any pool group, if any.

   ```
   user@host# delete access address-assignment mobile-pool-groups pool-group-xyz
     juniper-pool
   user@host# commit
   ```

5. If the pool is marked default pool, many APNs could be referencing this pool. In this case, delete the default pool attribute for the “juniper-pool.”

   ```
   user@host#  delete access address-assignment mobile-pools juniper-pool
     default-pool
   user@host# commit
   ```

6. Delete the pool “juniper-pool.”

   ```
   user@host#  delete access address-assignment mobile-pools juniper-pool
     routing-instance juniper-vrf
   user@host# commit
   ```

7. Verify that the address pool is deleted.

   ```
   user@host#  run show unified-edge ggsn-pgw address-assignment pool details
   ```

   The address pool “juniper-pool” should not be displayed in the show command output.

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Deleting a Mobile Address Pool on page 422

## Example: Modifying Mobile Interface Parameters



### Requirements

This example uses the following hardware and software components:

- An operational MX Series chassis
- Junos OS MobileNext Broadband Gateway package

### Overview

The following examples show how to make changes to a mobile interface.

### Configuration

Use the following examples to change to a mobile interface:

## Modifying the IPv4 Maximum Transmission Unit (MTU)

**Step-by-Step Procedure**

The following procedure shows how to modify the IPv4 maximum transmission unit (MTU).

1. Set the MX Series router in configuration mode.

   ```
   user@host# configure
   ```

2. On the *MBG1* gateway, place the APN *alice1* in maintenance mode.

   ```
   user@host# set unified-edge gateways ggsn-pgw MBG1 apn-services apn alice1
     service-mode maintenance
   ```

3. Commit maintenance mode.

   ```
   user@host# commit
   ```

4. Verify that the APN is in active maintenance mode where configuration changes will be accepted for this object and all of its subhierarchies.

   ```
   user@host# run show unified-edge ggsn-pgw apn service-mode apn alice1
     maintenance mode

   APN Name      : Service Mode
         alice1          : Maintenance - Active Phase
   ```

5. Change and commit the MTU to 1550.

   ```
   user@host# set interfaces mif unit 2 family inet mtu 1550
   user@host# commit
   ```

6. Commit your changes and exit maintenance mode.

   ```
   user@host# delete unified-edge gateways ggsn-pgw MBG1 apn-services apn alice1
     service-mode
   user@host# commit
   ```

7. Verify that the change has been made.

   ```
   user@host# show interfaces mif.2

       Logical interface mif.2 (Index 719) (SNMP ifIndex 771)
       Flags: SNMP-Traps Encapsulation: GTP-over-MIF
       Bandwidth: 1000mbps
       Input packets : 0
       Output packets: 0
       Protocol inet, MTU: 1550
        Flags: Sendbcast-pkt-to-re, User-MTU
       Protocol inet6, MTU: 1600
        Addresses, Flags: Is-Preferred
          Destination: fe80::/64, Local: fe80::2a0:a5ff:fc67:587b
   ```

8. Return the gateway to operational state.

   ```
   user@host# run show unified-edge ggsn-pgw gateway service-mode
   ```

## Changing the Mobile Interface for an Access Point Name (APN)

**Step-by-Step Procedure**

This procedure describes how to change the mobile interface for the APN casper from .0 to 222.

1. Verify the state of *casper*.

```
user@host# run show unified-edge ggsn-pgw apn service-mode

Maintenance Mode
  MM Active Phase - System is ready to accept configuration changes for all
        attributes of this object and its sub-hierarchies.
  MM In/Out Phase - System is ready to accept configuration changes only for
        non-maintenance mode attributes of this object and
        its sub-hierarchies.

APN Name                Service Mode

apn-vrf1.juniper.net        Operational
apn-vrf2.juniper.net        Operational
apn-vrf3.juniper.net        Operational
casper.com                  Operational
fuzz-gtp                    Operational
new-ipv4                    Operational
new-ipv6                    Operational
radius1                     Operational
realapn1                    Operational
static-assign               Operational
virtual-apn3.juniper.net    Operational
virtualapn.juniper.net      Operational
virtualapn2.juniper.net     Operational

[edit]
user@host#
```

2. Place the APN *casper.com*in maintenance mode.

```
user@host# set unified-edge gateways ggsn-pgw PGW apn-services apn casper.com
  service-mode maintenance
user@host# commit
```

3. Change the mobile interface.

```
user@host# set unified-edge gateways ggsn-pgw PGW apn-services apn casper.com
  mobile-interface mif.222
user@host# commit
```

4. Verify the change.

```
user@host# run show unified-edge gateways ggsn-pgw PGW apn-services apn
  casper.com

  apn-type real;
  apn-data-type ipv4v6;
  mobile-interface mif.222;
  address-assignment {
    local;
  }
```

```
anonymous-user {
  use-apnname;
}
dns-server {
  primary-v4 4.4.4.1;
}
p-cscf {
  2001:1:4:3::;
}
selection-mode {
  from-ms;
  from-sgsn;
}
service-mode maintenance; <---- mode

[edit]
user@host#
```

5. Return the APN “casper” to normal operation (exit maintenance mode and commit your changes).

```
user@host# delete unified-edge gateways ggsn-pgw PGW apn-services apn
  casper.com service-mode
user@host# commit
```

6. Return the gateway to operational state.

```
user@host# run show unified-edge ggsn-pgw gateway service-mode
```

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Deleting a Mobile Address Pool on page 422

## Example: Deleting a Session PIC

This example shows how to delete a session PIC using maintenance mode at the **[edit unified-edge gateways ggsn-pgw *ggsn-pgw-name* system session-pics interface]** or **[edit unified-edge gateways sgw *sgw-name* system session-pics interface]** hierarchy level. The session PIC can be an aggregated multiservices interface (AMS). Session PICs process control plane messages on a broadband gateway.



### Requirements

This example uses the following hardware and software components:

- An installed and operational MobileNext Broadband Gateway chassis

- Properly installed and operational Junos OS MobileNext Broadband Gateway software packages

Before you delete a session PIC using maintenance mode:

- Make sure that this change has been coordinated with affected groups and users.

## Overview

This configuration example shows how to put the session PIC interface in maintenance mode. Once in maintenance mode, you can delete the session PIC without affecting mobility subscribers using other session PICs.

### Topology

This procedure is independent of other network devices.

## Configuration

To configure session PIC maintenance mode and deletion, perform this tasks:


- Configuring Maintenance Mode for Session PIC Deletion on page 449
- Results on page 451


**CLI Quick Configuration**

Delete session PIC **ms-1/1/0** from gateway **MBG1**:

```
[edit]
set unified-edge gateways ggsn-pgw MBG1 system session-pics interface ms-1/1/0
   service-mode maintenance
commit
delete unified-edge gateways ggsn-pgw MBG1 system interface ms-1/1/0
commit
```

### Configuring Maintenance Mode for Session PIC Deletion

**Step-by-Step Procedure**

To configure maintenance mode and session PIC deletion:

1. Verify the current status of maintenance mode for this session PIC.

   user@MGB1> **show unified-edge ggsn-pgw MBG1 system interfaces service-mode**

NOTE: The service-mode option displays the information details about maintenance mode as well as status.

```
Maintenance Mode
  MM Active Phase - System is ready to accept configuration changes for all
        attributes of this object and its sub-hierarchies.
  MM In/Out Phase - System is ready to accept configuration changes only for
        non-maintenance mode attributes of this object and
        its sub-hierarchies.

Interface Name  Gateway Name  Service Mode
```

```
ms-1/0/0  MBG1   Operational
ms-1/1/0  MBG1   Operational
ms-2/0/0  MBG1   Operational
ms-2/1/0  MBG1   Operational
pfe-0/0/0  MBG1   Operational
pfe-0/1/0  MBG1   Operational
pfe-0/2/0  MBG1   Operational
pfe-0/3/0  MBG1   Operational
ams1   MBG1   Operational
```

2. Place the broadband gateway in configuration mode.

   ```
   user@MBG1# configure
   ```

3. On the gateway MBG1, place the interface **ms-1/1/0** in maintenance mode.

   ```
   user@MBG1# set unified-edge gateways ggsn-pgw MBG1 system session-pics
     interface ms-1/1/0 service-mode maintenance
   ```

4. Commit maintenance mode.

   ```
   user@MBG1# commit
   ```

5. Verify that the session PIC is in active maintenance mode where configuration changes will be accepted for this object and all of its subhierarchies.

   ```
   user@MGB1> show unified-edge ggsn-pgw MBG1 system interfaces service-mode

   Maintenance Mode
     MM Active Phase - System is ready to accept configuration changes for all
           attributes of this object and its sub-hierarchies.
     MM In/Out Phase - System is ready to accept configuration changes only for
           non-maintenance mode attributes of this object and
           its sub-hierarchies.

   Interface Name  Gateway Name  Service Mode
   ms-1/0/0  MBG1   Operational
   ms-1/1/0  MBG1   Maintenance - Active Phase
   ms-2/0/0  MBG1   Operational
   ms-2/1/0  MBG1   Operational
   pfe-0/0/0  MBG1   Operational
   pfe-0/1/0  MBG1   Operational
   pfe-0/2/0  MBG1   Operational
   pfe-0/3/0  MBG1   Operational
   ams1   MBG1   Operational
   ```

   NOTE: All subscribers serviced by the session PIC must go to zero. All Charging Data Records (CDRs) for these subscribers must be flushed out. You can wait for these conditions to be met, or use the clear command for the interface (or gateway) to force these conditions.

6. Delete the session PIC.

   ```
   user@MBG1# delete unified-edge gateways ggsn-pgw MBG1 system interface
     ms-1/1/0
   ```

7. Exit maintenance mode and commit.

NOTE: Deletion of a session PIC automatically exits maintenance mode for the deleted PIC.

```
user@MBG1# commit
```

The session PIC **ms-1/1/0** is removed from the gateway interface list.

```
user@MGB1> show unified-edge ggsn-pgw MBG1 system interfaces service-mode

Maintenance Mode
  MM Active Phase - System is ready to accept configuration changes for all
        attributes of this object and its sub-hierarchies.
  MM In/Out Phase - System is ready to accept configuration changes only for
        non-maintenance mode attributes of this object and
        its sub-hierarchies.

Interface Name  Gateway Name  Service Mode
ms-1/0/0  MBG1            Operational
ms-2/0/0  MBG1            Operational
ms-2/1/0  MBG1            Operational
pfe-0/0/0  MBG1           Operational
pfe-0/1/0  MBG1           Operational
pfe-0/2/0  MBG1           Operational
pfe-0/3/0  MBG1           Operational
ams1  MBG1  Operational
```

## Verification


- Verifying Session PIC Deletion on page 451


### Verifying Session PIC Deletion

**Purpose** To verify that the session PIC is no longer part of the gateway configuration.

**Action** Display the interfaces configured for the gateway.

```
user@MBG1> show unified-edge ggsn-pgw system interfaces
Gateway: MBG1
Interfaces  Members  Operational  Redundancy
            State    Role
ms-1/0/0        Active    Standalone
ms-2/0/0        Active   Standalone
ms-2/1/0        Active    Standalone
pfe-0/0/0       Active   Standalone
pfe-0/1/0       Active    Standalone
pfe-0/2/0       Active   Standalone
pfe-0/3/0       Active    Standalone
ams1        Active    Standalone
```

NOTE: The session PIC **ms-1/1/0** no longer appears on the list of gateway interfaces.

**Meaning** Deletion of session PIC successful.

## Troubleshooting Session PIC Deletion

To troubleshoot session PIC deletion with maintenance mode, perform this task:

- Troubleshooting a Commit Fail on page 452

### Troubleshooting a Commit Fail

**Problem** The final commit after deletion of the session PIC fails.

**Solution** The **ms-1/1/0** interface (FPC 1 and PIC 1) can still have the mobility package configured at the **[edit chassis]** hierarchy level. You must remove the **jservices-mobile** package from the session PIC configuration, then perform the commit.

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Deleting a Session PIC on page 423

# Example: Deleting a Services PIC

This example shows how to delete a services PIC using maintenance mode at the **[edit unified-edge gateways ggsn-pgw *ggsn-pgw-name* system service-pics interface]** or **[edit unified-edge gateways sgw *sgw-name* system service-pics interface]** hierarchy level. The services PIC can be an aggregated multiservices interface (AMS). Services PICs perform packet-related services on a broadband gateway.



## Requirements

This example uses the following hardware and software components:

- An installed and operational MobileNext Broadband Gateway chassis
- Properly installed and operational Junos OS MobileNext Broadband Gateway software packages

Before you delete a services PIC using maintenance mode:

- Make sure that this change has been coordinated with affected groups and users

## Overview

This configuration example shows how to put the services PIC interface in maintenance mode. Once in maintenance mode, you can delete the services PIC without affecting mobility subscribers using other services PICs.

### Topology

This procedure is independent of other network devices.

## Configuration

To configure services PIC maintenance mode and deletion, perform this task:

- Configuring Maintenance Mode for Services PIC Deletion on page 453
- Results on page 455

**CLI Quick Configuration**

Delete services PIC **ms-2/0/0** from gateway **MBG1**:

```
[edit]
set unified-edge gateways ggsn-pgw MBG1 system service-pics interface ms-2/0/0
   service-mode maintenance
commit
delete unified-edge gateways ggsn-pgw MBG1 system interface ms-2/0/0
commit
```

### Configuring Maintenance Mode for Services PIC Deletion

**Step-by-Step Procedure**

To configure maintenance mode for services PIC deletion:

1. Verify the current status of maintenance mode for this services PIC.

   user@MGB1> **show unified-edge ggsn-pgw MBG1 system interfaces service-mode**

   NOTE: The **service-mode** option displays the information details about maintenance mode as well as status.

```
Maintenance Mode
  MM Active Phase - System is ready to accept configuration changes for all
        attributes of this object and its sub-hierarchies.
  MM In/Out Phase - System is ready to accept configuration changes only for
        non-maintenance mode attributes of this object and
        its sub-hierarchies.

Interface Name  Gateway Name  Service Mode
ms-1/0/0  MBG1   Operational
ms-1/1/0  MBG1   Operational
ms-2/0/0  MBG1   Operational
```

```
ms-2/1/0  MBG1   Operational
pfe-0/0/0  MBG1   Operational
pfe-0/1/0  MBG1   Operational
pfe-0/2/0  MBG1   Operational
pfe-0/3/0  MBG1   Operational
ams1   MBG1   Operational
```

2. Place the broadband gateway in configuration mode.

   ```
   user@MBG1# configure
   ```

3. On the gateway MBG1, place the interface **ms-2/0/0** in maintenance mode.

   ```
   user@MBG1# set unified-edge gateways ggsn-pgw MBG1 system service-pics
     interface ms-2/0/0 service-mode maintenance
   ```

4. Commit maintenance mode.

   ```
   user@MBG1# commit
   ```

5. Verify that the services PIC is in active maintenance mode where configuration changes will be accepted for this object and all of its subhierarchies.

   ```
   user@MGB1> show unified-edge ggsn-pgw MBG1 system interfaces service-mode


   Maintenance Mode
     MM Active Phase - System is ready to accept configuration changes for all
           attributes of this object and its sub-hierarchies.
     MM In/Out Phase - System is ready to accept configuration changes only for
           non-maintenance mode attributes of this object and
           its sub-hierarchies.

   Interface Name  Gateway Name  Service Mode
   ms-1/0/0  MBG1   Operational
   ms-1/1/0  MBG1   Operational
   ms-2/0/0  MBG1   Maintenance - Active Phase
   ms-2/1/0  MBG1   Operational
   pfe-0/0/0  MBG1   Operational
   pfe-0/1/0  MBG1   Operational
   pfe-0/2/0  MBG1   Operational
   pfe-0/3/0  MBG1   Operational
   ams1   MBG1   Operational
   ```

   NOTE: All subscribers serviced by the services PIC must go to zero. All Charging Data Records (CDRs) for these subscribers must be flushed out. You can wait for these conditions to be met, or use the clear command for the interface (or gateway) to force these conditions.

6. Delete the services PIC.

   ```
   user@MBG1# delete unified-edge gateways ggsn-pgw MBG1 system interface
     ms-2/0/0
   ```

7. Exit maintenance mode and commit.

NOTE: Deletion of a services PIC automatically exits maintenance mode for the deleted PIC.

```
user@MBG1# commit
```

The services PIC **ms-2/0/0** is removed from the gateway interface list.

```
user@MGB1> show unified-edge ggsn-pgw MBG1 system interfaces service-mode

Maintenance Mode
  MM Active Phase - System is ready to accept configuration changes for all
        attributes of this object and its sub-hierarchies.
  MM In/Out Phase - System is ready to accept configuration changes only for
        non-maintenance mode attributes of this object and
        its sub-hierarchies.

Interface Name  Gateway Name  Service Mode
ms-1/0/0   MBG1              Operational
ms-1/1/0   MBG1              Operational
ms-2/1/0   MBG1              Operational
pfe-0/0/0   MBG1             Operational
pfe-0/1/0   MBG1             Operational
pfe-0/2/0   MBG1             Operational
pfe-0/3/0   MBG1             Operational
ams1   MBG1   Operational
```

## Verification


- Verifying Services PIC Deletion on page 455


### Verifying Services PIC Deletion

**Purpose** To verify that the services PIC is no longer part of the gateway configuration.

**Action** Display the interfaces configured for the gateway.

```
user@MBG1> show unified-edge ggsn-pgw system interfaces
Gateway: MBG1
Interfaces  Members  Operational  Redundancy
           State    Role
ms-1/0/0        Active    Standalone
ms-2/0/0        Active   Standalone
ms-2/1/0        Active    Standalone
pfe-0/0/0       Active   Standalone
pfe-0/1/0       Active    Standalone
pfe-0/2/0       Active   Standalone
pfe-0/3/0       Active    Standalone
ams1        Active    Standalone
```

NOTE: The services PIC ms-2/0/0 no longer appears on the list of gateway interfaces.

**Meaning** Deletion of services PIC successful.

**Related Documentation**
- Mobility Maintenance Mode Overview on page 406
- Deleting a Services PIC on page 425

## Example: Changing an AMS Interface

This example shows how to change the parameters for an aggregated multiservices (AMS) interface on a MobileNext Broadband Gateway using maintenance mode at the **[edit interfaces]** hierarchy level. If an AMS interface is configured under a gateway's session PICs or services PICs, and there is a change to any load-balancing options such as membership of AMS interfaces (**mams-**), then the AMS interface must be in maintenance mode.



### Requirements

This example uses the following hardware and software components:

- An installed and operational MobileNext Broadband Gateway chassis
- Properly installed and operational Junos OS MobileNext Broadband Gateway software packages

Before you change AMS parameters using maintenance mode:

- Make sure that this change has been coordinated with affected groups and users.

### Overview

This configuration example shows how to put the AMS interface in maintenance mode. Once in maintenance mode, you can delete a member (mams-) of the AMS group, add another member, and change the preferred backup, all without affecting mobility subscribers.

#### Topology

This procedure is independent of other network devices.

## Configuration

To configure AMS maintenance mode and parameter changes, perform this task:



**CLI Quick Configuration**

Delete **mams-5/1/0** from **ams1**, add **mams-3/1/0** to **ams1**, and configure **mams-3/1/0** as the new preferred backup for **ams1**:

```
[edit]
set unified-edge ggsn-pgw gateway-name system interface ams1 service-mode
  maintenance
commit
delete unified-edge ggsn-pgw gateway-name system interface ams1 load-balancing-options
  member-interface mams-5/1/0
set interfaces ams1 load-balancing-options member-interface mams-3/1/0
delete interfaces ams1 load-balancing-options high-availability-options many-to-one
  preferred-backup mams-5/1/0
set interfaces ams1 load-balancing-options high-availability-options many-to-one
  preferred-backup mams-3/1/0
delete unified-edge ggsn-pgw gateway-name system interface ams1 service-mode
  maintenance
commit
```

NOTE: This example requires changes at both the **[edit unified-edge]** and **[edit interfaces]** hierarchy levels. In this example, the interface **ams1** is set as **anchor-services-pics** at the **[edit unified-edge gateways ggsn-pgw MBG1 system]** hierarchy level.

### Configuring Maintenance Mode for AMS Parameter Change

**Step-by-Step Procedure**

To configure maintenance mode and AMS parameter change:

1. Verify the current status of maintenance mode for this AMS (**ams1**).

   user@MGB1> **show unified-edge ggsn-pgw MBG1 system interfaces service-mode**

NOTE: The **service-mode** option displays the information details about maintenance mode as well as status.

```
Maintenance Mode
  MM Active Phase - System is ready to accept configuration changes for all
        attributes of this object and its sub-hierarchies.
  MM In/Out Phase - System is ready to accept configuration changes only for
        non-maintenance mode attributes of this object and
        its sub-hierarchies.
```

```
Interface Name  Gateway Name  Service Mode
ms-1/0/0  MBG1   Operational
ms-1/1/0  MBG1   Operational
ms-2/0/0  MBG1   Operational
ms-2/1/0  MBG1   Operational
pfe-0/0/0  MBG1   Operational
pfe-0/1/0  MBG1   Operational
pfe-0/2/0  MBG1   Operational
pfe-0/3/0  MBG1   Operational
ams1   MBG1   Operational
```

2. Place the broadband gateway in configuration mode.

```
user@MBG1# configure
```

3. Show the current configuration for **ams1**

```
user@MBG1# show unified-edge ggsn-pgw gateway-name system interface ams1
load-balancing-options {
  member-interface mams-4/1/0;
  member-interface mams-5/1/0;
  member-failure-options {
    redistribute-all-traffic {
      enable-rejoin;
    }
  }
  high-availability-options {
    many-to-one {
      preferred-backup mams-5/1/0;
    }
  }
}
unit 1 {
  family inet;
}
unit 2 {
  family inet;
}
```

4. On the gateway MBG1, place the interface **ams1** in maintenance mode.

```
user@MBG1# set unified-edge ggsn-pgw gateway-name system interface ams1
  service-mode maintenance
```

5. Commit maintenance mode.

```
user@MBG1# commit
```

6. Verify that the **ams1** interface is in active maintenance mode where configuration changes will be accepted for this object and all of its subhierarchies.

```
user@MGB1> show unified-edge ggsn-pgw MBG1 system interfaces service-mode


Maintenance Mode
  MM Active Phase - System is ready to accept configuration changes for all
        attributes of this object and its sub-hierarchies.
  MM In/Out Phase - System is ready to accept configuration changes only for
        non-maintenance mode attributes of this object and
        its sub-hierarchies.
```

```
Interface Name  Gateway Name  Service Mode
ms-1/0/0   MBG1    Operational
ms-1/1/0   MBG1    Operational
ms-2/0/0   MBG1    Operational
ms-2/1/0   MBG1    Operational
pfe-0/0/0   MBG1    Operational
pfe-0/1/0   MBG1    Operational
pfe-0/2/0   MBG1    Operational
pfe-0/3/0   MBG1    Operational
ams1    MBG1    Maintenance - Active Phase
```

NOTE: All subscribers serviced by **ams1** must go to zero. All Charging Data Records (CDRs) for these subscribers must be flushed out. You can wait for these conditions to be met, or use the **clear** command for the interface (or gateway) to force these conditions.

7. Delete the **mams-5/1/0** member interface for **ams1**.

   ```
   user@MBG1# delete unified-edge ggsn-pgw gateway-name system interface ams1
     load-balancing-options member-interface mams-5/1/0
   ```

8. Add the **mams-3/1/0** member interface for **ams1** at the **[edit interfaces]** hierarchy level.

   ```
   user@MBG1# set interfaces ams1 load-balancing-options member-interface
     mams-3/1/0
   ```

9. Delete the **mams-5/1/0** member interface as the preferred backup for **ams1** at the **[edit interfaces]** hierarchy level.

   ```
   user@MBG1# delete interfaces ams1 load-balancing-options high-availability-options
     many-to-one preferred-backup mams-5/1/0
   ```

10. Add the **mams-3/1/0** member interface as the preferred backup for **ams1** at the **[edit interfaces]** hierarchy level.

    ```
    user@MBG1# set interfaces ams1 load-balancing-options high-availability-options
      many-to-one preferred-backup mams-3/1/0
    ```

11. Exit maintenance mode and commit.

    ```
    user@MBG1# delete unified-edge ggsn-pgw gateway-name system interface ams1
      service-mode maintenance
    user@MBG1# commit
    ```

The parameters for **ams1** are changed, so that **mams-3/1/0** has replaced **mams-5/1/0** as a member interface and preferred backup.

```
user@MBG1# show unified-edge ggsn-pgw gateway-name system interfaces ams1
load-balancing-options {
   member-interface mams-3/1/0;
   member-interface mams-4/1/0;
   member-failure-options {
      redistribute-all-traffic {
```

```
        enable-rejoin;
      }
    }
    high-availability-options {
      many-to-one {
        preferred-backup mams-3/1/0;
      }
    }
  }
  unit 1 {
    family inet;
  }
  unit 2 {
    family inet;
  }
```

## Verification



### Verifying AMS parameter change

**Purpose** To verify that the members of **ams1** have changed.

**Action** Display the interfaces configured for **ams1**.

```
user@MBG1> show unified-edge ggsn-pgw gateway-name system interfaces load-balancing ams1

Load-balancing interfaces detail
Interface   : ams1
State     : Up
Last change   : 00:11:28
Member count  : 2
HA Model    : Many-to-One
Members    :
  Interface   Weight State
  mams-4/1/0   10   Active
  mams-3/1/0  10   Backup
Sync-state   :
  Interface  Status
  mams-3/1/0  Unknown
  mams-4/1/0   Unknown
```

**Meaning** The parameters for **ams1** have successfully changed.

**Related Documentation**

- Mobility Maintenance Mode Overview on page 406
- Changing AMS Interface Parameters on page 427
- Changing Gateway Parameters with Maintenance Mode on page 430

PART 9

# Monitoring and Troubleshooting

CHAPTER 14

# Monitoring



## Monitoring the Mobile Environment - Key Performance Indicators

This topic describes the most common key performance indicators that you can use to determine the health of the Junos Mobility environment.

These key performance indicators include:

- GTP signaling statistics
- Session status indicators
- CPU utilization indicators
- Memory utilization indicators

- Monitored resource usage indicators (Address pools, system/APN bandwidth usage, Packet Forwarding Engine load, and so on)
- AAA authentication or accounting metrics
- Charging gateway status, congestion indicators with round trip time calculations
- Data path measurements
- Per server statistics for AAA, GTP, and CG
- Data rate measurements per configured interval

**Related Documentation**

- Monitoring Data Rate Statistics on page 470
- Monitoring Data Path Measurements on page 469
- Monitoring Session Status on page 465
- Monitoring GTP Signaling on page 464

## Monitoring Resources

To avoid overload conditions, monitor the following resources:

- Detailed control plane snapshot of number of bearers per state
- Number of bearers waiting for authentication, address allocation, data path setup, and so on
- CPU of each session PIC
- Memory consumed on each session PIC
- Maximum bearer limit
- Anchor Packet Forwarding Engine load
- Individual session PIC average load
- System data path bandwidth for assured quality of service
- Queue depths (AAA, charging, GTP input, and so on)
- External interfaces like RADIUS Charging Gateway by tracking success/fail, monitoring round trip time, and so on
- Internal resource usage for local pool addresses available and so on

## Monitoring GTP Signaling

To monitor GTP signaling, you can examine the messages and byte counts on Gn, S5, Gp, and S8 interfaces (statistics per APN, QCI per ARP, per GTP version, global).

You can also examine:

- Per peer history
- Per GTP cause code statistics for granular measurement of the number of failures
- Separate session establishments attempts/success counts
- Separate statistics for IPv4, IPv6, and dual address stack sessions

The following examples show how you can monitor GTP on the P-GW from the CLI.

1. To see the state of services PICs and PFEs, enter this command:

   user@host> **show unified-edge ggsn-pgw resource-manager clients**

```
Client    State      Redundancy
                        Role
pfe-0/2/0 In-Service Primary
pfe-0/0/0 In-Service Primary
ms-4/0/0  In-Service Primary
```

2. To see the resource management filters for GTP packet steering, enter the command:

   user@host> **show unified-edge rmps filters**

3. To see a summary of subscribers on the gateway, enter the command:

   user@host> **show unified-edge ggsn-pgw status detail**

4. To see subscriber details, enter the command:

   user@host> **show unified-edge ggsn-pgw subscribers extensive**

5. To show all GTP statistics (including messages sent and received, and cause codes sent and received), enter the command:

   user@host> **show unified-edge ggsn-pgw gtp statistics detail**

6. To see all the GTP peers, enter the command:

   user@host> **show unified-edge ggsn-pgw gtp peer detail**

**Related Documentation**

- Monitoring the Mobile Environment - Key Performance Indicators on page 463
- Monitoring Resources on page 464

## Monitoring Session Status

Current session/ bearer counts can be monitored at various levels. For example, per APN, per QCI/ARP, global, per RAT type, per APN, or per QCI.

A useful command to show these types of statistics is:

```
user@host>  show unified-edge ggsn-pgw qos statistics ?

Possible completions:
  <[Enter]>        Execute this command
  apn              APN name
  arp              GTPv2 ARP Value (1..15)
  gateway          Show subscriber for a gateway
  gtpv1-arp        GTPv1 ARP Value (1..3)
```

```
  qci                  Show QCI statistics information (1..9)
  traffic-class        Show statistics for a traffic-class level
  traffic-handling-priority  Traffic handling priority (1..3)
  |                    Pipe through a command
{backup}[edit]
user@host>
```

Use this command to examine session status indicators at the APN, gateway, and other levels.

**Related Documentation**

- Monitoring the Mobile Environment - Key Performance Indicators on page 463
- Monitoring Resources on page 464

## Monitoring CPU Indicators

Monitoring CPU utilization relies on gathering data from session PICs.

To see status indicators for all PICs, enter:

```
user@host> show unified-edge ggsn-pgw status detail
```

To see status indicators for the gateway, enter:

```
user@host> show unified-edge ggsn-pgw status detail

Mobile gateway status of fpc slot: 0  pic slot: 0
  State            :          Backup
  Active Subscribers  :         99652
  Active Sessions     :         99652
  Active Bearers      :         99652
  CPU Load (%)        :          0
  Memory Load (%)     :          29

  Mobile gateway status of fpc slot: 0  pic slot: 1
  State            :          Active
  Active Subscribers  :         99652
  Active Sessions     :         99652
  Active Bearers      :         99652
  CPU Load (%)        :          3
  Memory Load (%)     :          97

  Mobile gateway status of fpc slot: 2  pic slot: 0
  Active Subscribers  :          0
  Active Sessions     :          0
  Active Bearers      :          0
  CPU Load (%)        :          0
  Memory Load (%)     :          25

  Mobile gateway status of fpc slot: 2  pic slot: 1
  Active Subscribers  :          0
  Active Sessions     :          0
  Active Bearers      :          0
```

```
CPU Load (%)     :        0
Memory Load (%)  :       25
```

To see status indicators for an individual PIC (in the example shown, fpc-slot 2 pic-slot 0), enter:

```
user@host> show unified-edge ggsn-pgw status fpc-slot 2 pic-slot 0
```

**Related Documentation**

- Monitoring the Mobile Environment - Key Performance Indicators on page 463
- Monitoring Resources on page 464
- Monitoring Memory Indicators on page 467

## Monitoring Memory Indicators

You can monitor system memory by gathering data from session PICs just as you do for CPU usage.

To see memory indicators for all PICs, enter:

```
user@host> show unified-edge ggsn-pgw status detail
```

To see memory indicators for an individual PIC (in the example shown, fpc-slot 2 pic-slot 0), enter:

```
user@host> show unified-edge ggsn-pgw status fpc-slot 2 pic-slot 0
```

Additionally, users with vty command privileges can check system load as well. This is an average of CPU and memory load and displays as “current system load.” This command is:

```
user@host> show mcos gw-resourcetbl
```

**Related Documentation**

- Monitoring the Mobile Environment - Key Performance Indicators on page 463
- Monitoring Resources on page 464
- Monitoring CPU Indicators on page 466

## Monitoring Charging Gateways

Charging gateways can be monitored by checking status, pending CDR counts, and per transport profile.

The specific statistics you can gather per charging gateway are:

- Status (alive or dead)
- Number of echo requests: transmitted, received, and timeouts
- Number of echo responses: transmitted and received
- Number of version unsupported packets: transmitted and received
- Number of node alive requests: transmitted and received

- Number of node alive responses: transmitted and received
- Number of redirection requests: received
- Number of redirection responses: transmitted
- Number of data record transfer requests: transmitted and timeouts
- Number of data record transfer success responses: received
- Total round trip time of previous DRT (avg, max, min)

The following commands are examples of charging gateway statistics:

```
user@host> show unified-edge ggsn-pgw charging path stat
Charging Path Status Peer-Addr Peer-Name Local-Address Status Echo
  1.1.1.1 cg1 10.10.10.10 Down Enabled

  Charging Path Status
  Peer-Addr      Peer-Name     Local-Address    Status       Echo
  1.1.1.1        cg1           10.10.10.10      Down         Enabled


user@host> show unified-edge ggsn-pgw charging path statistics

  Charging Path Statistics

   CGF Address                 : 1.1.1.1      CGF Server Name       : cg1
   Echo Requests               Rx: 0          Echo Responses        Tx: 0
   Echo Responses              Rx: 0          Echo Requests         Tx: 6711
   Node-Alive Requests         Rx: 0          Node-Alive Responses  Tx: 0
   Version Not Supported       Rx: 0          Version Not Supported Tx: 0
   Echo Requests timed out     : 6710         Echo Interval         : 70
   Down Detection Interval     : 10           Reconnect Time Interval : 10
   Destination Port            : 3386         Pending Queue Size    : 0
   Path Manager FPC Slot       : 1            Path Manager PIC Slot : 0
   T3 Response Time Interval   : 5            Path Manager Port     : 30241
   Source Interface Valid      : Yes          GTPP Header Type      : long
   N3 Requests                 : 3            Local Address         : 10.10.10.10
  GTPP Version                 : V0           Transport Protocol    : UDP

user@host> show unified-edge ggsn-pgw charging transfer status

   Charging Transfer Status
   Transport-Profile : tp1
   Total UnAck CDR's      : 0
   Total Buffered CDR's   : 0

user@host> show unified-edge ggsn-pgw charging path statistics

  Charging Path Statistics

   CGF Address           : 1.1.1.1      CGF Server Name       : cg1
   Echo Requests         Rx: 0          Echo Responses        Tx: 0
   Echo Responses        Rx: 0          Echo Requests         Tx: 6711
   Node-Alive Requests   Rx: 0          Node-Alive Responses  Tx: 0
   Version Not Supported Rx: 0          Version Not Supported Tx: 0
   Echo Requests timed out  : 6710      Echo Interval         : 70
   Down Detection Interval  : 10        Reconnect Time Interval : 10
```

```
Destination Port       : 3386        Pending Queue Size     : 0
Path Manager FPC Slot  : 1           Path Manager PIC Slot  : 0
T3 Response Time Interval : 5        Path Manager Port      : 30241
Source Interface Valid : Yes         GTPP Header Type       : long
N3 Requests            : 3           Local Address          : 10.10.10.10
GTPP Version           : V0          Transport Protocol     : UDP
```

**Related Documentation**

- Monitoring the Mobile Environment - Key Performance Indicators on page 463
- Monitoring Resources on page 464

## Monitoring Data Path Measurements

Data path measurements include:

- Data path Gn statistics, including the number of incoming/outgoing GTP data packets/octets on the Gn interface
- Number of discarded GTP data packets
- Data path charging statistics, including per rating-group (bearer) up and down packets/bytes
- Data path Gi/IP measurements (does not include drops on the Gi Packet Forwarding Engine)
- Incoming and outgoing packets/octets on the Gi interface
- Discarded packets
- Data path debug and miscellaneous statistics (includes number of in-progress sessions, deleting sessions, source address violations, per APN ACL violations, and so on).
- Accurate per subscriber packet/byte statistics
- Per Traffic Class packet and byte counts statistics (also per APN, global)
- IP measurements

**Related Documentation**

- Monitoring the Mobile Environment - Key Performance Indicators on page 463
- Monitoring Resources on page 464

## Monitoring Call Rate Statistics

The following metrics are available in real time to monitor performance of the gateway call-rate indicators:

- Real-time measure of number of calls set up in the previous configurable interval
- Real-time measurement of session deactivations displayed per configurable interval
- Total data packets processed by the gateway in the past configured interval
- Total bytes of traffic handled by the gateway in the past interval

## Monitoring Data Rate Statistics

To monitor data rate statistics, enter:

```
user@host> show unified-edge ggsn-pgw statistics

Control plane statistics:
  Session establishment attempts:         1
  Successful session establishments:      1
  MS/peer initiated session deactivations:  2
  Successful MS/peer initiated deactivations: 2
  Gateway initiated session deactivations:  0
  Successful gateway initiated deactivations: 0
Data plane GTP statistics (Gn/S5/S8):
  Input  packets:      0
  Input  bytes:       0
  Output  packets:      7751
  Output  bytes:       7251652
  Discarded packets:      0
Data plane GTP statistics (Gi):
  Input  packets:      7751
  Input  bytes:       7251652
  Output  packets:      0
  Output  bytes:       0
  Discarded packets:      0
```

The following commands can be used for data plane statistics. There are two sets of statistics (one for the Gn interface and another for the Gi interface). The commands can be used either at the APN or the gateway level.

1. To see the gateway data plane statistics, use this command:

```
user@host> show unified-edge ggsn-pgw statistics gateway gateway-name

Control plane statistics:
  Session establishment attempts:         0
  Successful session establishments:      0
  MS/peer initiated session deactivations:  0
  Successful MS/peer initiated deactivations: 0
  Gateway initiated session deactivations:  0
  Successful gateway initiated deactivations: 0
Data plane GTP statistics (Gn/S5/S8):
  Input  packets:      0
  Input  bytes:       0
  Output  packets:      0
  Output  bytes:       0
  Discarded packets:      0
Data plane GTP statistics (Gi):
  Input  packets:      0
  Input  bytes:       0
  Output  packets:      0
  Output  bytes:       0
  Discarded packets:      0
```

2. To see the APN data plane statistics, use this command:

```
user@host> show unified-edge ggsn-pgw apn statistics apn-name apn-name

  Control plane APN statistics:
    Session establishment attempts:          0
    Successful session establishments:       0
    MS/peer initiated session deactivations:   0
    Successful MS/peer initiated deactivations: 0
    Gateway initiated session deactivations:   0
    Successful gateway initiated deactivations: 0
    MS initiated modification attempts:       0
    Successful MS initiated modifications:     0
    PGW/GGSN initiated modification attempts:   0
    Successful PGW/GGSN initiated modifications:0
    User authentication statistics:
      Authentication failures:           0
      Attempted authentications:         0
      Successful authentications:        0
    Address allocation statistics:
      dynamic IP allocation attempts:      0
      dynamic IP allocation success:       0
    Charging statistics:
      Number of CDRs allocated:          0
      Number of partial CDRs allocated:    0
      Number of CDRs closed:             0
      Number of containers closed        0
    Session Establishments Failed (by GTP cause):
      Others           0
      Service unavailable: 0
      System failure:     0
      No resources:       0
      No address:         0
      Service denied:     0
      Authentication Fail: 0
      APN access denied:   0
  Miscellaneous Packet statistics:
    IPv6 Router Solicitations received:       0
    IPv6 Router Advertisement transmitted:    0
  Data plane GTP statistics (Gn/S5/S8):
    Input    packets:       0
    Input    bytes:         0
    Output   packets:       0
    Output   bytes:         0
    Discarded packets:       0
  Data plane GTP statistics (Gi):
    Input    packets:       0
    Input    bytes:         0
    Output   packets:       0
    Output   bytes:         0
    Discarded packets:       0
```

**Related Documentation**

- Monitoring the Mobile Environment - Key Performance Indicators on page 463
- Monitoring Resources on page 464

## Call Trace Overview

The MobileNext Broadband Gateway features many ways to monitor performance while the broadband gateways, either Gateway GPRS Support Nodes (GGSNs), Packet Data Network Gateways (P-GWs), or Serving Gateways (S-GWs), configured are in operational mode. In addition to the usual logging and alarm capabilities, the broadband gateways offer a call trace capability that allows operators with the required privileges to trace the progress of a call through the gateway in several ways, for example, by Mobile Station ISDN (MS-ISDN) or International Mobile Subscriber Identifier (IMSI).

You can initiate a call trace based on several criteria:

- Access Point Name (APN) (P-GW only)
- FPC slot
- PIC slot
- IMSI
- MS-ISDN
- Next call (up to fifty)

You can perform several actions to manage the call trace monitor operation:

- Start the subscriber events trace
- Show the subscriber events trace information
- Stop the subscriber events trace
- Clear the subscriber events trace

Call trace offers another tool for broadband gateway performance monitoring and troubleshooting.

**Related Documentation**

- Monitoring the Mobile Environment - Key Performance Indicators on page 463
- Example: Monitoring a P-GW with Call Trace on page 491
- Example: Monitoring an S-GW with Call Trace on page 493

## Tracing Control Packets



### Requirements

This example uses the following hardware and software components:

- An operational MX chassis

- Junos OS Mobility package

## Tracing Control Packets

This section shows how to trace Gi to Gn control packets.

To efficiently monitor the data path, perform the following checks:

- Verify that the Gn interface (IFL) is receiving packets.

```
user@host> show jnh if statistics

      IFL Name        Index    In(Packets/Bytes)   Out(Packets/Bytes)
---------------- ---------- -------------------- --------------------
```

Verify that the packets are hitting the filter.

```
user@host>show filter

Program Filters:
---------------
  Index    Dir    Cnt   Text    Bss  Name
-------- ------ ------ ------ ------ --------

Term Filters:
------------
  Index   Semantic   Name
-------- ---------- ------
     1 Classic   __default_bpdu_filter__
 17000 Classic   __default_arp_policer__
 57008 Classic   __cfm_filter_shared_lc__
 65280 Classic   __auto_policer_template__
 65281 Classic   __auto_policer_template_1__
 65282 Classic   __auto_policer_template_2__
 65283 Classic   __auto_policer_template_3__
 65284 Classic   __auto_policer_template_4__
 65285 Classic   __auto_policer_template_5__
 65286 Classic   __auto_policer_template_6__
 65287 Classic   __auto_policer_template_7__
 65288 Classic   __auto_policer_template_8__
46137345 Classic   HOSTBOUND_IPv4_FILTER
46137346 Classic   HOSTBOUND_IPv6_FILTER
67108864 Classic   __mobile_gw_impl_filter__    <<<<<<<<<<
```

Display counters for index 67108864.

```
user@host> show filter index 67108864 counters

Filter Counters/Policers:
  Index         Packets          Bytes  Name
-------- -------------------- -------------------- --------
67108864                    5                 1025 __gtpc_pkt_count
67108864                    5                  500 __gtpu_pkt_count
67108864                    0                    0 __mgw_ip_frags_count
67108864                    0                    0 __sp-1-0_GTP_pkt_count
```

```
67108864          0          0 __sp-1-0_LIBAAA_pkt_count
67108864          0          0 __sp-1-0_LIBCHRG_pkt_count
```

Check the group TEID route table.

```
user@host> show route gtp-c

1/8                    Service  653
1.0/13                 Service  653
1.0.0.0.0/40             Service  653
```

NOTE: The *1* at the beginning here is the GTP-C route-type. If the *teid=0* route (1.0.0.0.0/40) is missing, verify that rmpsd on the Routing Engine installed those routes or verify that it is running.

```
user@host> show filter nexthops

                    Name Protocol      Type Option Refcount  NH ID
------------------------------ -------- ----------- ------ -------- -----
  ms-1/0/0.16000:mgw:SPFE-AAA   IPv4    service  0x01     0   650
 ms-1/0/0.16000:mgw:SPFE-CHRG   IPv4    service  0x01     0   648
  ms-1/0/0.16000:mgw:SPFE-SMA   GTP-U   service  0x01     0   653
 ms-1/0/0.16000:mgw:SPFE-UPIC   GTP-U   service  0x01     0   656
```

Display details on service 653.

```
user@host> show nhdb id 653 extensive

  ID    Type    Interface   Next Hop Addr   Protocol    Encap    MTU    Flags  PFE internal
 Flags
----- -------- ------------- --------------- ---------- ------------ ---- ----------
--------------------
 653  Service -         -            GTP-U        -    0  0x00000000 0x00000000
Target NH: 654
PFE#0, Target Addr = 0x1fcbc1
    SvcDesc   = 0x1fcbff
PFE#1, Target Addr = 0x1fcbfe
    SvcDesc   = 0x1fcbfd
```

Verify the nexthop target 654.

```
user@host> show nhdb id 654 extensive

  ID   Type    Interface   Next Hop Addr   Protocol    Encap    MTU    Flags  PFE internal
 Flags
```

Check whether the NH-id point to the correct ms-ifl.

```
user@host> show mobile-edge halp ucode-nhs

  Nexthop ID                Purpose
  ------------------------------------------------
```

```
4194306                 GTPv0 parsing ucode
4194307                 GTP-C v1/v2 parsing ucode
4194308                 GTP-U swap ports ucode
4194309                 DHCP parsing ucode
4194310                 GTP-C table NH
4194311                 GTP-U table NH
```

Check to see whether packets are discarded or punted the to host.

```
user@host> show jnh 0 exceptions

Ucode Internal ---------------------- mcast stack overflow
...

Packet Exceptions
----------------------
bad ipv4 hdr checksum          DISC( 2)
non-IPv4 layer3 tunnel         DISC( 4)        0       0
GRE unsupported flags          DISC( 5)        0       0
tunnel pkt too short           DISC( 6)        0       0
bad IPv6 options pkt           DISC( 9)        0       0
bad IP hdr                     DISC(11)        0       0
bad IP pkt len                 DISC(12)        0       0
L4 len too short               DISC(13)        0       0
invalid TCP fragment           DISC(14)        0       0
mtu exceeded                   DISC(21)        0       0
frag needed but DF set         DISC(22)        0       0
ttl expired                    PUNT( 1)        0       0
IP options                     PUNT( 2)        0       0
control pkt punt via ucode     PUNT( 4)        0       0
frame format error             DISC( 0)
tunnel hdr needs reassembly    PUNT( 8)        0       0
GRE key mismatch               DISC(76)        0       0
my-mac check failed            DISC(28)
frame relay type unsupported   DISC(38)        0       0
IGMP snooping control packet   PUNT(12)        0       0
bad CLNP hdr                   DISC(43)        0       0
bad CLNP hdr checksum          DISC(44)        0       0
incorrect length in GTP header DISC(45)        0       0
GTP header errors              DISC(46)        0       0
Bearer using different IP address DISC(47)     0       0
expecting sequence number      DISC(48)        0       0
sequence number isnt correct   DISC(49)        0       0
SR is marked for traffic discard DISC(50)      0       0

Firewall
----------------------
mac firewall                   DISC(78)
firewall discard               DISC(67)        0       0
tcam miss                      DISC(16)        0       0
firewall reject                PUNT(36)        0       0
firewall send to host          PUNT(53)        0       0

Routing
----------------------
```

```
discard route              DISC(66)       0       0
hold route                 DISC(70)       0       0
mcast rpf mismatch         DISC( 8)       0       0
resolve route              PUNT(33)       0       0
control pkt punt via nh    PUNT(34)       0       0
host route                 PUNT(32)    2313   92940
ICMP redirect              PUNT( 3)       0       0
mcast host copy            PUNT( 6)       0       0
reject route               PUNT(40)       0       0

Misc
----------------------
debug                   DISC(65)       0       0
services pkt internal test      PUNT(38)       0       0
directed bcast             DISC(89)       0       0
virtual-chassis pkt(hi)       PUNT(54)       0       0
virtual-chassis pkt(lo)       PUNT(55)       0       0
virtual-chassis error         DISC(42)       0       0
ME-subcriber policing out of spec packet dropsDISC(52)       0       0
```

To display non-zero counters, enter:

```
host@user> show jnh 0 exceptions terse

Reason                  Type      Packets    Bytes
=============================================================================

Routing
 ----------------------
host route                 PUNT(32)    2393   96140
```

Another example is: a v2 call comes in with QCI 5 and gets mapped to FC af5. On that queue, you can see the PPS for the Gn-facing interface and the Gi-facing interface

```
user@host> show interfaces queue ge-1/2/5 forwarding-class af5
```

Where 1/2/5 is the Gn-facing interface. Then enter:

```
user@host> show interfaces queue ge-1/2/1 forwarding-class af5
```

Where 1/2/1 is the Gi-facing interface.

## Configuration


- Tracing Packets on page 476


### Tracing Packets

**Results** This example illustrated the steps you can take to trace control packets.

**Related Documentation**


- Monitoring the Mobile Environment - Key Performance Indicators on page 463
- Monitoring Resources on page 464

# How to Trace Data Packets from Gn to Gi Interfaces



## Requirements

This example uses the following hardware and software components:

- An operational MX chassis
- Junos OS Mobility package

## Tracing Data Packets

This section shows how to trace Gn to Gi (GTP-U) data packets.

## Configuration



### Setting up Data Packet Tracing

**Step-by-Step Procedure**

The following procedure shows how to trace GTP-U (Gn to Gi) data packets.

1. Verify that the Gn/S5 interface is receiving packets.

```
user@host> show jnh if statistics

    IFL Name          Index       In(Packets/Bytes)       Out(Packets/Bytes)
...
```

2. Verify that the filter is seeing GTP-U packets by finding the index of the implicit RTT filter used by mobility applications.

```
user@host> show filter UE address prefix

Program Filters:
---------------
  Index    Dir    Cnt   Text    Bss  Name
-------- ------ ------ ------ ------ --------

Term Filters:
------------
  Index   Semantic  Name
--------  ---------- ------
     2 Classic   __default_bpdu_filter__
 17000 Classic   __default_arp_policer__
 57008 Classic   __cfm_filter_shared_lc__
 65280 Classic   __auto_policer_template__
 65281 Classic   __auto_policer_template_1__
 65282 Classic   __auto_policer_template_2__
```

```
  65283 Classic   __auto_policer_template_3__
  65284 Classic   __auto_policer_template_4__
  65285 Classic   __auto_policer_template_5__
  65286 Classic   __auto_policer_template_6__
  65287 Classic   __auto_policer_template_7__
  65288 Classic   __auto_policer_template_8__
46137345 Classic   HOSTBOUND_IPv4_FILTER
46137346 Classic   HOSTBOUND_IPv6_FILTER
46137347 Classic   __me_uplink_exception_filter_ipv4__
46137349 Classic   __me_uplink_exception_filter_ipv6__
67108864 Classic   __mobile_gw_impl_filter__        <----
```

3. Verify that the filter has the correct GGSN IP address (172.23.9.100 in the following output) in the filter.

```
user@host> show filter index 67108864 program

Filter index = 67108864
Optimization flag: 0xf7
Filter notify host id = 0
Filter properties: None
Filter state = CONSISTENT
term IP-Fragments
term priority 0
  is-fragment
    value & 0x3fff != 0x0000
    false branch to match protocol in rule GTP-U
  destination-address
    172.23.9.100/32 <----
    false branch to match protocol in rule GTP-U

  then
    action next-hop, type (nh-id)
        4194308
    count __mgw_ip_frags_count
term GTP-U
term priority 0
  protocol
     17
    false branch to match action in rule default-term
  port
     2152
    false branch to match port in rule GTP-C
  destination-address
    172.23.9.100/32 <----
    false branch to match port in rule GTP-C

  then
    action next-hop, type (nh-id)
        4194308
    count __gtpu_pkt_count
term GTP-C--
term priority 0
  port
     2123
    false branch to match port in rule sp-1/0_LIBAAA_udp_start_10000
```

```
destination-address
  172.23.9.100/32
  false branch to match port in rule sp-1/0_LIBAAA_udp_start_10000

then
  action next-hop, type (nh-id)
      4194307
  count __gtpc_pkt_count
```

4. Verify that the implicit RTT firewall filter counter for GTP-U is incrementing.

```
user@host> show filter index 67108864 counters

Filter Counters/Policers:
  Index        Packets          Bytes  Name
-------- -------------------- -------------------- --------
67108864              2              452 __gtpc_pkt_count
67108864              2              584 __gtpu_pkt_count <----
67108864              0                0 __mgw_ip_frags_count
67108864              0                0 __sp-1-0_GTP_pkt_count
67108864              0                0 __sp-1-0_LIBAAA_pkt_count
67108864              0                0 __sp-1-0_LIBCHRG_pkt_count
```

5. Verify that the GTP-U ingress ucode NH is created and is not marked as *Discard*.

```
user@host> show mobile-edge halp ucode-nhs

Nexthop ID                Purpose
-------------------------------------------------

4194306                  GTPv0 parsing ucode
4194307                  GTP-C v1/v2 parsing ucode
4194308                  GTP-U ingress ucode
4194309                  DHCP parsing ucode
4194310                  GTP-C table NH
4194311                  GTP-U table NH
4194312                  GTP-U restore packet context ucode
4194313                  IP frag load balancing ucode


host@user> show nhdb id 4194308 extensive

ID  Type  Interface  Next Hop Addr  Protocol  Encap  MTU  Flags  PFE internal
 Flags
4194308  Unicast -       -          GTP-U       -   0 0x00000000 0x00008004

Flags:          0x00000000
PFE internal flags: 0x00008004

Dram Bytes    : 268
PreComputed MTU: 0
Flags         : 0x0
Parent NHID   :0


PFE:0

Encap-ptr chain:
```

```
----------------

Dram Bytes: 268
```

6. Verify that the GTP-U route table is set up correctly on the Gn ingress Packet Forwarding Engine.

```
host@user> show route gtp-u

default                 Service  653
0.0.0.0                 Service  647
0.32/16                 Unicast  666 mif.16000
```

NOTE: Data TEID route should be present in the gtp-u table (0.32/16 in this case, which is **teid starting with 0x02**). Since any Packet Forwarding Engine can be ingress Packet Forwarding Engine, the same GTP-U route table is present on all Packet Forwarding Engines. NH-id 666 in the route corresponds to the anchor Packet Forwarding Engine.

7. To find the anchor Packet Forwarding Engine, execute the following command. The L2 interface identifies the anchor Packet Forwarding Engine. In the output below, fpc 0 pic 0 is the anchor Packet Forwarding Engine.

```
host@user> show nhdb id 666 extensive

 ID  Type  Interface  Next Hop Addr  Protocol  Encap  MTU  Flags PFE internal
 Flags
  666  Unicast  mif.16000  default          IPv4  Unspecified  0  0x10000000
0x00000000

Flags:          0x10000000
PFE internal flags: 0x00000000
  L2-Interface: pfe-0/0/0.16383 (81) <------- ANCHOR PFE

Dram Bytes    : 268
PreComputed MTU: 0
Flags         : 0x10000000
Parent NHID   :0
      Feature List: NH
        [pfe-0]: 0xce811db000200005;
       f_mask:0x00400000; c_mask:0x80000000; f_num:11; c_num:1,  inst:0
      Idx#9     ucast:
        [pfe-0]: 0xce811db000200005

<.....SNIP.....>
```

8. Verify that the subscriber is installed in the anchor Packet Forwarding Engine (LU id = 0 here).

```
host@user> show vbf hw 0 subscriber-table uplink

+----------+----------+--------+--------+--------+-------+--------+----------+----------+
| RINDEX   | TEID     | VRF ID | TFT ID | CONFIG | FLAGS | CHRGID | CHRGADDR |
IPADDR   |
```

```
+----------+----------+--------+--------+--------+-------+--------+----------+----------+
|0xf    |0x200001 |0x0   |0x0   |0x2210 |0x1  |0x0   |0x80000e |0x27270802|
|0xb    |0x200000 |0x0   |0x0   |0x2210 |0x1  |0x0   |0x800000 |0x27270801|
+----------+----------+--------+--------+--------+-------+--------+----------+----------+
| TOTAL: 2                                                                  |
+----------+----------+--------+--------+--------+-------+--------+----------+----------+
```

9. Verify that there are no GTP parsing errors on the anchor Packet Forwarding Engine.

NOTE: Also verify that the *In* stats on the Gn (S5) interface are incrementing.

```
st@user> show vjnh 0 exceptions terse
```

**Related Documentation**

- Monitoring the Mobile Environment - Key Performance Indicators on page 463
- Monitoring Resources on page 464

## Trace Data Packets from Gi to Gn Interfaces

- Requirements on page 481
- Tracing Data Packets on page 481
- Configuration on page 481

### Requirements

This example uses the following hardware and software components:

- An operational MX chassis
- Junos OS Mobility package

### Tracing Data Packets

This topic shows how to trace Gi to Gn data packets.

### Configuration

- Setting up Data Packet Tracing on page 481

#### Setting up Data Packet Tracing

**Step-by-Step Procedure**

The following examples explain how to trace Gi to Gn data packets.

1. Verify that an aggregate route is installed. In this case, aggregate route 39.39.4/22 for user equipment is present in the Gi VRF (inet.0 in the following example).

```
user@host> show mobile-gateways subscribers
```

| MSISDN | Subscriber Address | Peer Address | APN |
|---|---|---|---|

```
1234567890          39.39.4.1   172.23.9.196   internet123
1234567891          39.39.4.2   172.23.9.196   internet123
```

2. To see details for subscribers, enter:

```
user@host> show mobile-gateways subscribers extensive

MSISDN : 1234567890        Subscriber Address - V4 : 39.39.4.1
   IMSI  : 22321321312336f    Control Plane Peer Address : 172.23.9.196
   NSAPI/EBI : 5              Data Plane Peer Address : 172.23.9.196
   Control TEID - Local : 8000000       Remote : 101
   Data TEID   - Local : 100000         Remote : 102
   APN name : internet123               Charging ID : 8000000
   Control - FPC : 1  PIC : 0   Anchor PFE : 129
   QCI/ARP : 5 /0     GBR: 0       MBR: 0
   Subscriber state : Established       Bearer State :   Established
                      Bearer Substate : -
   Last statistics collection time : None collected

   MSISDN : 1234567892        Subscriber Address - V4 : 39.39.4.2
   IMSI  : 22321321312337f    Control Plane Peer Address : 172.23.9.196
   NSAPI/EBI : 5              Data Plane Peer Address : 172.23.9.196
   Control TEID - Local : 8000001       Remote : 103
   Data TEID   - Local : 100001         Remote : 104
   APN name : internet123               Charging ID : 8000001
   Control - FPC : 1  PIC : 0   Anchor PFE : 129
   QCI/ARP : 5 /0     GBR: 0       MBR: 0
   Subscriber state : Established       Bearer State :   Established
                      Bearer Substate : -
   Last statistics collection time : None collected
```

3. Since the user equipment IP address starts with **39.39**, look for aggregation routes with that prefix.

```
user@host> show route ip table index 0r

IPv4 Route Table 0, default.0, 0x0:
Destination   NH IP Addr     Type    NH ID Interface
------------  ---------------  --------  -----  ---------
default                          Reject   42
0.0.0.0                          Discard   40
10.255.15.135             10.255.15.135     Local   576
12.9.1.1                12.9.1.1        Local   645 ms-1/0/0.0
29.29.29/24                       Discard   626 mif.0
29.29.29.100              29.29.29.100      Local   625
39.39.4/22                        Unicast   677 mif.0  <---
```

4. Verify that the NH for the aggregate route uses mif ifl for the APN to which the subscriber belongs and that the NH's L2 interface corresponds to the anchor Packet Forwarding Engine.

```
user@host> show nhdb id 677 extensive

  ID    Type    Interface   Next Hop Addr   Protocol     Encap    MTU     Flags  PFE
internal Flags
-----  --------  -------------  ---------------  ----------  ------------  ----  ----------
--------------------
 677  Unicast  mif.0       default          IPv4  Unspecified    0  0x08000000
```

```
0x00000000

Flags:          0x08000000
PFE internal flags: 0x00000000
 L2-Interface: pfe-0/0/0.16383 (82) <--- ANCHOR PFE
```

5. Verify that the anchor Packet Forwarding Engine has the subscriber entry (in this example: LU id 0).

```
user@host> show vbf hw 0 subscriber-table downlink

+----------+--------+----------+--------+-------+--------+----------+----------+--------+
| RINDEX   | VRF ID | IPADDR   | CONFIG | FLAGS | CHRGID | CHRGADDR | TEID     |
NHID  |
+----------+--------+----------+--------+-------+--------+----------+----------+--------+
|0x4     |0x0    |0x27270401|0x2210 |0x0    |0x0    |0x800000 |0x65     |0x2ac  |
|0x3     |0x0    |0x27270402|0x2210 |0x0    |0x0    |0x80000e |0x67     |0x2ac  |
+----------+--------+----------+--------+-------+--------+----------+----------+--------+
| TOTAL: 2                                                                            |
+----------+--------+----------+--------+-------+--------+----------+----------+--------+
```

For a specific subscriber, you can verify that it uses the right peer NH.

```
user@host> show vbf hw 0 subscriber downlink id 39.39.4.1

Key:
      Major Version: 0
      Minor Version: 2
         Overflow: 0
       TFT Rule Id: 0
        Unique Id: 0
        IPV4 ADDR: 0x27270401
Ext Data:
       IDLE-TO PROFILE-ID: 0
          AAA PROFILE-ID: 0
                QCI: 5
             Policing: Disabled
          Reporting Stats: Disabled
          Charging Stats: Enabled
                Drop: 0
           Send to Upic: 0
                Valid: 1
                Proto: V4
           Seq Num Proc: Disabled
              Gtp Ver: 1
         Num VBF ext words: 0
           Num VBF words: 1
          Charg Stat Addr: 0x800000
         Charg Profile Id: 0
          Trigger Pending: 0
           Vol Limit Hit: 0
          Time Limit Hit: 0
         Tariff Change Hit: 0
           Delete Event: 0
           Signal Event: 0
             Tariff Id: 0
           Update First: 0
```

```
    Time Limit Check: 0
      Chrg Inst Id: 0
      Policer Type: 0
     Policer Color: 0
      Policer Oper: 0
     Policer Count: 0
 Policer Addr Offset: 0x0000
Reporting Stats Addr: 0x000000
      Remote Index: 0x0006
       VBF Info[0]: 0x58
       VBF Info[1]: 0x17
       VBF Info[2]: 0x81
       VBF Info[3]: 0xaa
       VBF Info[4]: 0x0
       VBF Info[5]: 0x0
       VBF Info[6]: 0x0
       VBF Info[7]: 0x0
       VBF Info[8]: 0x0
       VBF Info[9]: 0x0
      VBF Info[10]: 0x0
      VBF Info[11]: 0x0
      VBF Info[12]: 0x0
      VBF Info[13]: 0x0
      VBF Info[14]: 0x0
      VBF Info[15]: 0x0
      VBF Info[16]: 0x0
      VBF Info[17]: 0x0
      VBF Info[18]: 0x0
      VBF Info[19]: 0x0
      VBF Info[20]: 0x0
      VBF Info[21]: 0x0
      VBF Info[22]: 0x0
      VBF Info[23]: 0x0
      VBF Info[24]: 0x0
      VBF Info[25]: 0x0
      VBF Info[26]: 0x0
      VBF Info[27]: 0x0
Sideband:
template nh vaddr: 0xd0239f
    peer nh id: 0x02ac
  udp src port: 0x00000000000000
       TEID: 0x00000000000065
   exp seq num: 0x00000000000000
```

NOTE: Peer nh id 0x02ac (684 decimal) is the NH that performs the GTP encapsulation. Template NH is the MIF OIF start. Having Zero peer nh id causes the downlink traffic to fail.

6. Verify the S-GW/SGSN IP address and other fields used in the GTP encapsulation from the peer NH.

```
user@#host> show nhdb id 684 extensive1
```

```
 ID    Type    Interface   Next Hop Addr   Protocol    Encap    MTU     Flags  PFE
internal Flags
----- -------- ------------- --------------- ---------- ------------ ---- ----------
--------------------
 684  Unicast  mif.16000    default          IPv4  Unspecified    0  0x04000000
0x00000000

Flags:          0x04000000
PFE internal flags: 0x00000000

Dram Bytes    : 268
PreComputed MTU: 0
Flags         : 0x4000000
Parent NHID   :0
      Feature List: NH
        [pfe-0]: 0x08fe5b2000010000;
        [pfe-1]: 0x08fe5b1000010000;
       f_mask:0x00600000; c_mask:0xc0000000; f_num:11; c_num:2,  inst:-1
      Idx#9     ucast:
        [pfe-0]: 0x1007f2fe00ffffff
        [pfe-1]: 0x1007f2f3c0ffffff

      Idx#10 ifl-output:
        [pfe-0]: 0x27fffff80001040c
        [pfe-1]: 0x27fffff80001040c



PFE:0

Encap-ptr chain:
----------------
Encapsulation Pointer (0x46a86d58) data:
   Encap-ptr-type:gtp
   Ucode EType:tunnel-encaps
   Ref Count:1
   Control-Word: GTP(0x03)
   Jnh-mem: size: 2; addr: 0x82
   Key: 0x0d000003ffffffff-ac1709c4ac170964401100:

  GTP Details:
      Allow Frag,

     SrcIP: 172.23.9.100  <-- GGSN/MBG1 IP address

     DstIP: 172.23.9.196 <-- SGSN/SGW IP address

       ttl: 64
       l4_proto: 17
       l3_proto: V4
  JNH words:0x2802200000030000   JNH words:0xac170964ac1709c4



PFE:1
```

```
Encap-ptr chain:
----------------
Encapsulation Pointer (0x46a86d58) data:
  Encap-ptr-type:gtp
  Ucode EType:tunnel-encaps
  Ref Count:1
  Control-Word: GTP(0x03)
  Jnh-mem: size: 2; addr: 0x84
  Key: 0x0d000003ffffffff-ac1709c4ac170964401100:

 GTP Details:
    Allow Frag,

   SrcIP: 172.23.9.100

   DstIP: 172.23.9.196

    ttl: 64
    l4_proto: 17
    l3_proto: V4
 JNH words:0x2802200000030000   JNH words:0xac170964ac1709c4
```

7. Verify that the MIF OIF features are correct.

```
user@#host> show jnh 0 vread 0xd0239f

Addr:0xd0239f, Data = 0x08fe580000030000

NPC0(curve vty)# sh jnh 0 decode 0x08fe580000030000

CallNH:desc_ptr:0x1fcb00, mode=0, rst_stk=0x0, count=0x3
 0x1fcafc  0 : 0x27fffff80001640c  <-- Per subscriber Fixed classifier applied on
MIF IFL
 0x1fcafd  1 : 0x02000fe52e000804  <-- Proto-type demux
 0x1fcafe  2 : 0x08fe50e000010000  <-- Mobile edge features (per subscriber
policer, charging)
 0x1fcaff  3 : 0x1274040ea00003c0  <-- WAN out
```

8. Verify subscriber-fixed classifier applied on MIF IFL.

```
user@#host> show jnh 0 decode 0x27fffff80001640cf
  UcodeNH:Vbf Indirect, var-id = VBF_VAR_IFL_FIXED_CLASSIFIER(11)
```

9. Verify the demux prototype.

```
user@#host> show jnh 0 decode 0x02000fe52e000804
  IndexNH:key_ptr:0x80/0, desc_ptr=0x1fca5c, max=8, nbits=4
```

10. Verify mobile edge features (per subscriber policer, charging).

```
user@#host> show jnh 0 decode 0x08fe50e000010000

CallNH:desc_ptr:0x1fca1c, mode=0, rst_stk=0x0, count=0x1
 0x1fca1a  0 : 0xc800000725200041
 0x1fca1b  1 : 0xc800000000000040

NPC0(curve vty)# sh jnh 0 decode 0xc800000725200041
```

```
JNH_ME_NH:
    opcode = 0x00000019
    desc_ptr = 0x00000000
    data = 0x39290002
    func_code = 0x00000001
JNH_ME_NHDATA_ME_POLICER:
    normal = 0x0000e4a4
    ext_data = 0x00000000
    default = 0x00000000
    parameterized = 0x00000001
    next_nh = 0x00000000


NPC0(curve vty)# sh jnh 0 decode 0xc800000000000040

JNH_ME_NH:
    opcode = 0x00000019
    desc_ptr = 0x00000000
    data = 0x00000002
    func_code = 0x00000000
JNH_ME_NHDATA_ME_CHARGING:
    report_stat_en = 0x00000000
    default = 0x00000000
    parameterized = 0x00000001
    next_nh = 0x00000000
```

11. Verify WAN.

```
user@#host> show jnh 0 decode 0x1274040ea00003c0

ModifyNH: Subcode=SetQueue(9),Desc=0xd0103a,Data=0x3c0,NextNH=1


Dram Bytes: 440
```

**Related Documentation**

- Monitoring the Mobile Environment - Key Performance Indicators on page 463
- Monitoring Resources on page 464
- How to Trace Data Packets from Gn to Gi Interfaces on page 477

## How to Verify Charging Statistics Processing



### Requirements

This example uses the following hardware and software components:

- An operational MX chassis

- Junos OS Mobility package

## Verifying Packet Forwarding Engine Charging Statistics Are Processing Properly

This section shows an example of verifying that Packet Forwarding Engine charging statistics are processed from the LU to the Stats agent.

## Configuration



### Processing Packet Forwarding Engine Charging Statistics

**Step-by-Step Procedure**

The following procedure shows how to verify that charging statistics are transferred from the LU to Stats agent via TOE. The three components required to ship charging statistics from the forwarding plane to the control plane are:

- Callout thread: This is a 0.5 sec periodic thread that runs in the LU and is responsible for preparing the charging statistics.
- Charging thread: This thread runs on the LU TOE and is responsible for shipping charging statistics from the LU to the Stats agent.
- Stats agent: This runs on the Packet Forwarding Engine host CPU and is responsible for forwarding charging statistics to the charging module.

The sequence of charging statistics transfer is:

- Callout thread populates charging statistics data in the Callout FIFO.
- Callout thread triggers Charging thread to notify it of availability of data in the Callout FIFO.
- Charging thread checks whether space is available on the Stats FIFO to successfully transfer statistics from the Callout FIFO.
- If there is not enough space available on the Stats FIFO, the Charging thread aborts the statistics read from the Callout FIFO.
- If enough space is available in the Stats FIFO, then the Charging thread completes the transfer in two steps:
  - Copy statistics data from Callout FIFO to TOE Lmem.
  - DMA statistics data from TOE Lmem to Stats FIFO

Follow these steps to verify proper charging statistics handling.

1. Verify that the Callout thread is populating charging statistics in the Callout FIFO. Check the Callout FIFO descriptor to see whether the Tail (write) pointer moves. The Callout thread increments this Tail (write) pointer by the number of words that it wrote to the Callout FIFO. Therefore, if the Tail (wr) pointer moves, it means that the Callout thread is writing to the Callout FIFO.

   user@host> **show jnh 0 ucode-vars**

```
...
ME CHRG information:
Base address                    : 0xc0000026
ME CHRG fifo tail(wr)/head(rd)  : 2/0    <================= Check if tail(wr)
pointer moves
ME CHRG fifo base/size          : 0x01300000/1048576
ME CHRG next walk cookie        : 16140901064495857675
ME CHRG time stamp              : 335007768900
```

NOTE: In the preceding snippet, 2/0 means that Tail (write) is 2 and Head (read) is 0. A value of 2 for Tail (write) means that the Callout thread has written two words to Callout FIFO.

2. Verify that the charging thread is being triggered by the callout thread to indicate data availability for transfer. The callout thread triggers the charging thread to notify it of availability of data in the callout FIFO. To verify that the charging thread is seeing these triggers, you could dump the TOE mobile-edge counters where the count of triggers from the callout thread is maintained. The count represents the count of triggers that the charging thread is able to honor—that is, the charging thread has determined that there are enough resources available to initiate a transfer.

```
user@host> show toe pfe 3 lu 0 mobile-edge counters

                Counter block location in LMEM: 0x4270

Host FIFO full          : 0
Callout FIFO empty      : 0
Host addr buff size unaligned : 0
Host addr page size unaligned : 53
Test Reg 1              : 0
Test Reg 2              : 0
Callout-to-LMEM copy bytes   : 231368
LMEM-to-Host dma bytes       : 231368
Callout triggers        : 2675      <=== count of triggers from Callout thread
```

3. Verify that the Stats FIFO is full. The charging thread checks whether space is available on the Stats FIFO to successfully transfer statistics from the callout FIFO. If the Stats FIFO is full, the transfer is not initiated. For each trigger from the callout thread, the charging thread checks the status of the Stats FIFO and if it is full, increments the counter.

```
user@host> show toe pfe 3 lu 0 mobile-edge counters

Counter block location in LMEM: 0x4270

Host FIFO full          : 0    <=== increments on each trigger from
                                    Callout thread, if Stats FIFO is FULL and
                                     trigger cannot be "honored"
Callout FIFO empty      : 0
Host addr buff size unaligned : 0
Host addr page size unaligned : 53
```

```
Test Reg 1              : 0
Test Reg 2              : 0
Callout-to-LMEM copy bytes   : 231368
LMEM-to-Host dma bytes      : 231368
Callout triggers         : 2675
```

4. Verify that the charging thread is reading the charging statistics from the callout FIFO. Check the TOE mobile-edge counters to get the total number of “bytes” of charging data transferred by the Charging thread, from the Callout FIFO to the TOE LMem.

```
user@host> show toe pfe 3 lu 0 mobile-edge counters

Counter block location in LMEM: 0x4270

Host FIFO full          : 0
Callout FIFO empty       : 0
Host addr buff size unaligned : 0
Host addr page size unaligned : 53
Test Reg 1              : 0
Test Reg 2              : 0
Callout-to-LMEM copy bytes   : 231368   <== Number of bytes transferred from
                                           Callout FIFO to TOE LMem
LMEM-to-Host dma bytes      : 231368
Callout triggers         : 2675
```

5. Verify that the charging thread is sending charging data to the Stats FIFO. Check the TOE mobile-edge counters to get the number of “bytes” of charging statistics transferred by the charging thread, from the TOE LMem to Stats FIFO.

```
user@host> show toe pfe 3 lu 0 mobile-edge counters

Counter block location in LMEM: 0x4270

Host FIFO full          : 0
Callout FIFO empty       : 0
Host addr buff size unaligned : 0
Host addr page size unaligned : 53
Test Reg 1              : 0
Test Reg 2              : 0
Callout-to-LMEM copy bytes   : 231368
LMEM-to-Host dma bytes      : 231368      <=== Number of bytes transferred by
                                            charging thread from TOE LMem to Stats
FIFO
Callout triggers         : 2675
```

**Related Documentation**

- Monitoring the Mobile Environment - Key Performance Indicators on page 463
- Monitoring Resources on page 464

# Example: Monitoring a P-GW with Call Trace

This example shows how to monitor MobileNext Broadband Gateway Packet Data Network Gateway (P-GW) operation with call trace.



## Requirements

This example uses the following hardware and software components:

- An installed and operational MobileNext Broadband Gateway chassis
- The properly installed and Operational Junos OS MobileNext Broadband Gateway software packages

Before you use call trace for monitoring, be sure you have:

- Made sure that this P-GW is configured correctly

## Overview

This example shows how to monitor the P-GW operation using call trace.

### Topology

This procedure is independent of other network devices.

## Configuration

To use call trace monitoring, perform these tasks:



### Monitoring with Call Trace

**Step-by-Step Procedure**

To use call trace monitoring:

1. Start the call trace.

```
user@MGB1> request unified-edge ggsn-pgw call-trace start imsi 101313783444554
```

NOTE: This example uses IMSI number as the basis for the call trace.

```
Service PIC    Status
ms-0/0/0         success
ms-10/0/0      success
```

2. Display the call trace information.

```
user@MGB1> request unified-edge ggsn-pgw call-trace show detail

  Call trace information :

   Identifier : call_trace_id_1       Trace file : call_trace_id_1_01142012_152946
   Status : not-done    Create Mask : 0x44      Complete Mask : 0x0
   IMSI : 505002003476097
   Calls Traced : 1
```

3. Stop the call trace. You can stop all traces at once, as shown here.

```
user@MGB1> request unified-edge ggsn-pgw call-trace stop all


   Service PIC    Status
   ms-0/0/0     success
   ms-10/0/0     success
```

4. Display the available trace files.

```
user@MGB1> request unified-edge ggsn-pgw call-trace show


   Identifier        File name             Status      SPIC Mask   SPIC Mask
                                          create     complete
   call_trace_id_1 call_trace_id_1_01142012_152946      done    0x44     0x44
   {master}
```

5. Display the contents of a call trace log file. Just as Syslog files, call traces are stored in **/var/log**.

```
user@MGB1> request unified-edge ggsn-pgw call-trace show
  /var/log/call_trace_id_1_01142012_152946

  Dec  5 16:12:30.1118022 cpu_id: [6] gtid: [9] tid: [2] app_id: 1 Encode: Encoding GTP
   V1 Header
  Dec  5 16:12:30.1118044 cpu_id: [6] gtid: [9] tid: [2] app_id: 1 Encode: Msg Type 17
  SeqNumber 584 TEID 302149215
  Dec  5 16:12:30.1118067 cpu_id: [6] gtid: [9] tid: [2] app_id: 1 Encode: Encoding
  CAUSE IE
  Dec  5 16:12:30.1118088 cpu_id: [6] gtid: [9] tid: [2] app_id: 1 Encode: Encoding cause
   Authentication failure
  Dec  5 16:12:30.1118109 cpu_id: [6] gtid: [9] tid: [2] app_id: 1 Encode: ERROR: Non
  successful cause value(208) sent
  Dec  5 16:12:30.1118131 cpu_id: [6] gtid: [9] tid: [2] app_id: 1 Encode: ENCODED Error
   Response of length 14 for msg 17


  Nov 26 16:20:53.1327494 cpu_id: [5] gtid: [8] tid: [1] app_id: 1 change reporting
  action not supported
  Nov 26 16:20:53.1327997 cpu_id: [5] gtid: [8] tid: [1] app_id: 1 Handler returned
  PASS
  Nov 26 16:20:53.1328020 cpu_id: [5] gtid: [8] tid: [1] app_id: 1 calling afProcessEvent
   for event=sessUpdate, state=Established
  Nov 26 16:20:53.1328042 cpu_id: [5] gtid: [8] tid: [1] app_id: 1 i = 0, size = 1,
  evtProtocolBitmap = 19 info->cause = 0, info->sub_cause = 0
  Nov 26 16:20:53.1328068 cpu_id: [5] gtid: [8] tid: [1] app_id: 1 calling session-evt
  handler #0 for state=Established, event=sessUpdate info->cause = 0,
  info->subcause=0, num_handlers=1
```

**Related Documentation**

- Monitoring the Mobile Environment - Key Performance Indicators on page 463
- Call Trace Overview on page 472
- Example: Monitoring an S-GW with Call Trace on page 493

## Example: Monitoring an S-GW with Call Trace

This example shows how to monitor MobileNext Broadband Gateway Packet Data Network Gateway (S-GW) operation with call trace.



### Requirements

This example uses the following hardware and software components:

- An installed and operational MobileNext Broadband Gateway chassis
- The properly installed and Operational Junos OS MobileNext Broadband Gateway software packages

Before you use call trace for monitoring, be sure you have:

- Made sure that this S-GW is configured correctly

### Overview

This example shows how to monitor the P-GW operation using call trace.

#### Topology

This procedure is independent of other network devices.

### Configuration

To use call trace monitoring, perform these tasks:



#### Monitoring with Call Trace

**Step-by-Step Procedure**

To use call trace monitoring:

1. Start the call trace.

```
user@MGB1> request unified-edge sgw call-trace start fpc-slot 4 pic-slot 0 next-call
10
```

NOTE: This example uses FPC and PIC and next-call option as the basis for the call trace.

```
Service PIC       Status
ms-0/0/0  success
ms-1/0/0  success
```

2. Display the call trace information.

```
user@MGB1> rrequest unified-edge sgw call-trace show brief

Call trace information :
 Identifier : call_trace_id_10    Trace file :
call_trace_id_10_02112012_205634
 Status : done   Create Mask : 0x0  Complete Mask : 0x0
 Next Call : 10
 Calls Traced : 0      FPC : 5   PIC : 0
Identifier : call_trace_id_11    Trace file :
call_trace_id_11_02112012_205932
Status : done    Create Mask : 0x40  Complete Mask : 0x40
Calls Traced : 0
Identifier : call_trace_id_12    Trace file :
call_trace_id_12_02112012_210001
Status : not-done   Create Mask : 0x40  Complete Mask : 0x0
Next Call : 5
Calls Traced : 0      FPC : 4   PIC : 0
Identifier : call_trace_id_13    Trace file :
call_trace_id_13_02112012_210353
Status : duplicate   Create Mask : 0x0  Complete Mask : 0x0
Next Call : 5
Calls Traced : 0      FPC : 4   PIC : 0
```

3. Stop the call trace. You can stop all traces at once, as shown here.

```
user@MGB1> request unified-edge sgw call-trace stop all

Service PIC    Status
ms-0/0/0       success
ms-1/0/0    success
```

4. Display the available trace files.

```
user@MGB1> request unified-edge sgw call-trace show

Identifier       File name            Status     SPIC Mask   SPIC Mask
                                                 create     complete
call_trace_id_1 call_trace_id_1_01142012_152946     done   0x44    0x44
{master}
```

5. Display the contents of a call trace log file. Just as Syslog files, call traces are stored in **/var/log**.

```
user@MGB1> request unified-edge sgw call-trace show
  /var/log/call_trace_id_1_01142012_152946

Dec  5 16:12:30.1118022 cpu_id: [6] gtid: [9] tid: [2] app_id: 1 Encode: Encoding GTP
 V1 Header
Dec  5 16:12:30.1118044 cpu_id: [6] gtid: [9] tid: [2] app_id: 1 Encode: Msg Type 17
SeqNumber 584 TEID 302149215
Dec  5 16:12:30.1118067 cpu_id: [6] gtid: [9] tid: [2] app_id: 1 Encode: Encoding
```

```
CAUSE IE
Dec  5 16:12:30.1118088 cpu_id: [6] gtid: [9] tid: [2] app_id: 1 Encode: Encoding cause
 Authentication failure
Dec  5 16:12:30.1118109 cpu_id: [6] gtid: [9] tid: [2] app_id: 1 Encode: ERROR: Non
successful cause value(208) sent
Dec  5 16:12:30.1118131 cpu_id: [6] gtid: [9] tid: [2] app_id: 1 Encode: ENCODED Error
 Response of length 14 for msg 17
```

```
Nov 26 16:20:53.1327494 cpu_id: [5] gtid: [8] tid: [1] app_id: 1 change reporting
action not supported
Nov 26 16:20:53.1327997 cpu_id: [5] gtid: [8] tid: [1] app_id: 1 Handler returned
PASS
Nov 26 16:20:53.1328020 cpu_id: [5] gtid: [8] tid: [1] app_id: 1 calling afProcessEvent
 for event=sessUpdate, state=Established
Nov 26 16:20:53.1328042 cpu_id: [5] gtid: [8] tid: [1] app_id: 1 i = 0, size = 1,
evtProtocolBitmap = 19 info->cause = 0, info->sub_cause = 0
Nov 26 16:20:53.1328068 cpu_id: [5] gtid: [8] tid: [1] app_id: 1 calling session-evt
handler #0 for state=Established, event=sessUpdate info->cause = 0,
info->subcause=0, num_handlers=1
```

**Related Documentation**

- Monitoring the Mobile Environment - Key Performance Indicators on page 463
- Call Trace Overview on page 472
- Example: Monitoring a P-GW with Call Trace on page 491

CHAPTER 15

# Troubleshooting

This chapter describes the proper actions to take to restore network health when performance or processes are not behaving as expected.



## Troubleshooting Overload Conditions in the Mobile Network

The common causes of an overload condition are:

- An external server (RADIUS, DHCP, charging gateway, PCRF, and so on) is down for an extended period of time
- A burst of GTP control messages from a rebooted peer
- Capacity overload due to oversubscribed system limits
- Management operations such as bulk session deletes
- Peer reboot leading to bulk deletes resulting in higher CPU consumption

**Related Documentation**

- Troubleshooting Mobility

## Troubleshooting Multilevel Overload Protection

To troubleshoot multilevel overloads, consider:

- Configurable low and high thresholds in percentage for each resource monitored
- Configurable Local policy to apply when the resource low or high threshold is reached

NOTE: For example: When memory usage reaches 70%, accept only calls with an allocation and retention priority (ARP) of 5 and higher. When memory usage reaches 90%, accept only calls with ARP of 3 or higher.

- Internal redirection policy to equally distribute calls to various session PICs in the chassis

**Related Documentation**

- Troubleshooting Mobility
- Responding to an Overload on page 498

## Responding to an Overload

To respond to an overload condition, consider:

- Apply gating to incoming calls and service high-priority subscribers
- Generate alarms, traps, and logs to notify the operator
- Throttle request generated toward external entities
- Configurable redirection policy to forward calls matching a certain criteria to an external gateway
- Configurable priority-level (ARP) to service during overload condition
- Each component dynamically reports load to the central resource controller for real-time admission control.

These are default actions that the gateway performs when overload conditions occur.

**Related Documentation**

- Troubleshooting Mobility

## Monitoring GTP Signaling

To monitor GTP signaling, you can examine the messages and byte counts on Gn, S5, Gp, and S8 interfaces (statistics per APN, QCI per ARP, per GTP version, global).

You can also examine:

- Per peer history
- Per GTP cause code statistics for granular measurement of the number of failures
- Separate session establishments attempts/success counts
- Separate statistics for IPv4, IPv6, and dual address stack sessions

The following examples show how you can monitor GTP on the P-GW from the CLI.

1. To see the state of services PICs and PFEs, enter this command:

   user@host> **show unified-edge ggsn-pgw resource-manager clients**

```
Client    State      Redundancy
                        Role
pfe-0/2/0 In-Service Primary
pfe-0/0/0 In-Service Primary
ms-4/0/0  In-Service Primary
```

2. To see the resource management filters for GTP packet steering, enter the command:

   user@host> **show unified-edge rmps filters**

3. To see a summary of subscribers on the gateway, enter the command:

   user@host> **show unified-edge ggsn-pgw status detail**

4. To see subscriber details, enter the command:

   user@host> **show unified-edge ggsn-pgw subscribers extensive**

5. To show all GTP statistics (including messages sent and received, and cause codes sent and received), enter the command:

   user@host> **show unified-edge ggsn-pgw gtp statistics detail**

6. To see all the GTP peers, enter the command:

   user@host> **show unified-edge ggsn-pgw gtp peer detail**

**Related Documentation**

- Monitoring the Mobile Environment - Key Performance Indicators on page 463
- Monitoring Resources on page 464

## Troubleshooting Alarms, Logs, and Traps

The mobility system generates and retains the following congestion statistics:

Current congestion status peak congestion hits

- Time when the last congestion occurred
- Duration the last congestion lasted
- Number of calls rejected during congestion
- SNMP traps
- System logs

The following are GTP traps:

- jnxMbgPgwGtpPeerGWUpNotif

  The state of a GTP peer (control or data) has changed to UP. The GTP peer in trap is specified as “Rem: 200.6.1.2 Loc: 200.6.88.1 vrf: 0 [Ctrl]" where ‘Rem’ is the remote IP address, ‘Loc’ is the local IP address, and ‘vrf’ is the vrf instance. ‘Ctrl’ indicates that this is a GTP-C peer. ‘For the GTP-U peer, string ‘Data’ is present in place of ‘Ctrl’. This trap is generated only if GTP path management for the GTP peer is enabled.

- jnxMbgPgwGtpPeerDownNotif

The state of a GTP peer (control or data) has changed to DOWN. The GTP peer in trap is specified as “Rem: 200.6.1.2 Loc: 200.6.88.1 vrf: 0 [Ctrl]" where ‘Rem’ is the remote IP address, ‘Loc’ is the local IP address,and ‘vrf’ is the vrf instance. ‘Ctrl’ indicates that this is GTP-C peer. For GTP-U peer, string ‘Data’ will be present in place of ‘Ctrl’. This trap is generated only if GTP path management for the GTP peer is enabled.

- jnxMbgPgwGtpPeerDNThresPerPeerNotif

  The total number of GTP peer (control or data) down events per GTP peer have crossed a threshold. The GTP peer in trap is specified as “Rem: 200.6.1.2 Loc: 200.6.88.1 vrf: 0 [Ctrl]" where ‘Rem’ is remote IP address, ‘Loc’ is local IP address, ‘vrf’ is vrf instance. ‘Ctrl’ indicates that this is GTP-C peer. For GTP-U peer, string ‘Data’ is present in place of ‘Ctrl’. If the number becomes higher than the “raise threshold,” then value 1 in field jnxMbgPgwGtpAlarmState indicates the alarm-state “raised,” and if the number becomes less than “clear threshold,”’ then value 0 in field jnxMbgPgwGtpAlarmState indicates alarm-state “cleared”. This trap is generated only if GTP path management for the GTP peer is enabled.

- jnxMbgPgwGtpNumDiscardedGtpcPktThresNotif

- The following are the Subscriber Manager traps:

  - jnxMbgPgwSMGtpEventNotif

    An important GTP event has occurred. jnxMbgPgwSMGTPEventType indicates the type of event (for example, “PDP_CTXT_CREATE_REJECT” ) and jnxMbgPgwSMGTPEventCause indicates the cause of the event (for example, “RESOURCE_ERR”).

  - jnxMbgPgwSMSubscribersThresGblNotif The total number of subscribers in the system has crossed a threshold.

    NOTE: For this trap and all remaining Subscriber Manager traps, two thresholds (“High” and “Low”) have been defined. For each threshold, this notification is generated when a threshold is crossed. The notification is not generated as soon as the threshold is crossed. The notification with jnxMbgPgwSMAlarmState = “RAISED” is generated if this notification has not already been generated for a threshold or the trap with jnxMbgPgwSMAlarmState = “CLEARED” has been generated for a threshold and the number stays above a threshold for a duration of 3 minutes (default) . The notification with jnxMbgPgwSMAlarmState = “CLEARED” is generated if the notification with jnxMbgPgwSMAlarmState = “CLEARED” has been generated for a threshold and the number stays below the threshold for a duration of 3 minutes (default). jnxMbgPgwSMAlarmThrshld indicates the threshold that was crossed. jnxMbgPgwSMAlarmState (RAISED/CLREAD) indicates if the number is more than the threshold (“RAISED”) or is less than the threshold (“CLEARED”).

  - jnxMbgPgwSMSubscribersThresPerSPNotif

The total number of subscribers per services PIC has crossed a threshold. jnxMbgPgwSMSPICName indicates the services PIC for which this trap was generated.

- jnxMbgPgwSMSessionEstFailThresPerSPNotif

  The total number of session establishment failures per Service PIC has crossed a threshold. jnxMbgPgwSMSPICName indicates the services PIC for which this trap was generated.

- jnxMbgPgwSMSessionEstFailThresPerTCNotif

  The total number of session establishment failures per traffic class (GTPv1) has crossed a threshold. jnxMbgPgwSMQCIName indicates the TC (Traffic Class) for which this trap was generated.

- jnxMbgPgwSMSessionEstFailThresPerQCINotif

  The total number of session establishment failures per QoS class identifier (GTPv2) has crossed a threshold. jnxMbgPgwSMQCIName indicates the QCI for which this trap was generated.

- jnxMbgPgwSMBearersThresGblNotif

  The total number of bearers in the system has crossed a threshold.

- jnxMbgPgwSMBearersThresPerSPNotif

  The total number of bearers per services PIC has crossed a threshold. jnxMbgPgwSMSPICName indicates the services PIC for which this trap was generated.

**Related Documentation**

- Troubleshooting Mobility

## Troubleshooting Admission Control

This topic discusses class of service (CoS) and call admission control (CAC) serviceability.

To troubleshoot call admission control, you should understand the classifier policy profiles configured on your system. A classifier policy is the configuration that maps QCI (4G) and TC/THP (3G) to internal forwarding queues and defines packet loss priority. You can have multiple classifier policy profiles on your system. Therefore, understanding how these multiple classifiers interact with your system and with each other is key to understanding what to look for when you have problems with admission control.

To understand CoS, you must understand the CoS policy. This policy is the configuration that manges quality of service (QoS) parameters. You can have multiple CoS policies on your system.

CoS and CAC serviceability also depends on two other configurations:

- Resource threshold policy which controls your system for CAC. You can have multiple resource threshold policies configured on your system.

- The bandwidth pool, which allocates bandwidth sharing among APNs and the gateway. You can have multiple bandwidth pools configured on your system.

Finally, you need to know about local policies. A local policy is a collection of a classifier profile, a CoS policy profile, a resource threshold policy profile, and a bandwidth pool. A local policy is so termed because it is attached to the gateway or to individual APNs.

You can troubleshoot class of service and call admission control by examining:

- Total system bandwidth and per APN bandwidth can be configured with percentage allocations to each QCI/Traffic-Class.
- System ensures each QCI gets allocated system bandwidth optimally
- Maximum-bearers configuration for the gateway
- High or low threshold percentages for CPU, memory, system load, or maximum bearers with local policy to apply when a threshold is reached
- Forwarding-class or loss-priority definition per QCI or traffic class
- Local policy to cap maximum GBR, MBR, and AMBR values per APN

Use the following commands to troubleshoot this environment:

- For subscribers, use the command:

  user@host > **show unified-edge ggsn-pgw subscribers extensive**

- For preemption lists (priority levels), use the command:

  user@host > **show unified-edge ggsn-pgw status preemption-list detail**

To debug QoS negotiation parameters:

1. Check the session status to determine whether it is a visitor, roaming, or home session.
2. Look up the local policy being applied to the APN.
3. Match this local policy with its classifier profile, the CoS policy, and the bandwidth pool

To troubleshoot calls rejected by CAC:

1. Identify rejected calls by entering:

   user@host > **show unified-edge ggsn-pgw qos statistics apn** ***apn-name***l

   Counters such as “No resources”, “Service denied”, “Authentication Fail”, “APN access denied” indicate rejected calls, but not necessarily by CAC.

2. To verify the cause for rejected calls, look in the Routing Engine stats section:

   Active Bearers
   CPU Load (%)
   Memory Load (%)

   These counters can indicate that the system is running out of resources.

3. To verify that resource exhaustion is the source of the problem, enter these commands:

```
user@host > show unified-edge rmps table gateway-bearers
user@host > show unified-edge rmps table apn-bearers
user@host > show unified-edge rmps table anchor-pfe-bandwidth
user@host > show unified-edge rmps table bandwidth-pools
```

**Related Documentation**

- Troubleshooting Mobility

## Monitoring AAA Metrics

AAA server metrics include:

- Server Up/Down status traps
- Network element status traps
- Real-time latency and flow control statistics

RADIUS logs are useful for troubleshooting an AAA profile. The following sections show logs for create, update, delete, and dynamic requests.

Create Session requests communicate with the S-GW, the P-GW, and the RADIUS server in the following manner:

```
S-GW --> Create Session request --> P-GW --> Access Request --> RADIUS
P-GW <-- Access Accept <-- RADIUS
P-GW --> Accounting Start request ->> RADIUS
S-GW <-- Create Session response <-- P-GW
P-GW <-- Accounting Start response <-- RADIUS
S-GW <-- Create Session response <-- P-GW
```

If **apn wait-accounting** is enabled (it is disabled by default), then the P-GW sends the Create Session response after receiving the Accounting Start response.

The following RADIUS logs show how these Create Session requests are processed. When there is a breakdown in AAA communications, the logs help you isolate the cause of the problem.

1. Access the RADIUS log, enable trace options, and look for Authentication and Accounting messages.

```
Jun 24 11:50:19 1001025 gtid:[26]tid: [2] jsimRadius(2) Access-Request
IP 10.10.2.11 20024 >

...

Jun 24 11:50:19 1013620 gtid:[24]tid: [0] Access-Accept

...

Jun 24 11:50:19 1022764 gtid:[25]tid: [1] jsimRadius(1)
Accounting-Request IP 10.10.2.11 20025 >
```

```
...

Jun 24 11:50:19 1033840 gtid:[26]tid: [2] Accounting-Response
```

Interim requests can be configured to generate accounting requests periodically or they are generated when the S-GW generates a Modify bearer Request. When a Modify bearer Request is received, communication with the S-GW, P-GW, and RADIUS server flows in the following manner:

S-GW --> Modify bearer request --> P-GW
P-GW --> Interim request --> RADIUS
P-GW <-- Dynamic request <-- RADIUS
P-GW <-- CoA <-- RADIUS
S-GW <-- Update bearer request <-- P-GW
S-GW --> Update bearer response --> P-GW
P-GW ---> CoA ACK --> RADIUS
P-GW ---> Interim accounting response --> RADIUS

NOTE: Modify bearer requests are generated by subscriber location information changes, QoS changes, roaming, time-zone changes, and so on.

The following RADIUS logs show how these interim Accounting messages are processed. When there is a breakdown in AAA communications, the logs help you isolate the cause of the problem.

1. Access the RADIUS log, enable trace options, and look for Authentication and Accounting messages.

```
Jun 24 11:58:28 879452 gtid:[25]tid: [1] Accounting-Request

...

Jun 24 11:58:28 880542 gtid:[25]tid: [1] Acct-Status-Type [40] 4 0000
0003

...

Jun 24 11:58:28 880818 gtid:[25]tid: [1] Acct-Input-Octets [42] 4 0000
00064 <- Data flow

...

Jun 24 11:58:28 880849 gtid:[25]tid: [1] Acct-Output-Octets [43] 4 0000
00064 <- Data flow

...

Jun 24 11:58:28 891299 gtid:[25]tid: [1] Accounting-Response
```

Accounting stop (delete) requests communicate with the S-GW, the P-GW, and the RADIUS server in the following manner:

S-GW --> Delete Session request --> P-GW
P-GW --> Accounting Stop request --> RADIUS
S-GW <-- Delete Session response <-- P-GW
S-GW <-- Delete Session request <-- P-GW
P-GW --> Accounting Sstop --> RADIUS

For a dynamic stop request, the flow is:

P-GW <-- Disconnect request <-- RADIUS
S-GW <-- Delete Session request <-- P-GW
P-GW --> Accounting Stop --> RADIUS

The following RADIUS logs show how these Delete Accounting messages are processed. When there is a breakdown in AAA communications, the logs help you isolate the cause of the problem.

1. Access the RADIUS log, enable trace options, and look for Accounting Stop messages.

```
Jun 24 12:06:29 957706 gtid:[25]tid: [1] jsimRadius(1) Accounting-Request
IP 10.10.2.11 20025 >

...

Jun 24 12:06:29 958502 gtid:[25]tid: [1] Acct-Status-Type [40] 4 0000
0002

...

Jun 24 12:06:29 958785 gtid:[25]tid: [1] Acct-Input-Octets [42] 4 0000
00c8 <- Data flow

...

Jun 24 12:06:29 958815 gtid:[25]tid: [1] Acct-Output-Octets [43] 4 0000
00c8 <- Data flow

...

Jun 24 12:06:29 974810 gtid:[26]tid: [2] Accounting-Response
```

NOTE: In the displays in this section, **acct-status-type** ends with a four-digit code. The last number of this code is meaningful. A code that ends in **0001** means the process is starting. A code that ends in **0002** means the process is stopping. A code that ends in **0003** means the process is in an interim state, which allows parameters to be changed.

The following aggregate show commands are useful for troubleshooting AAA processes.

- To show AAA statistics authentication details for a specific interface:

  user@host> **show unifed-edge ggsn-pgw aaa statistics authentication detail fpc-slot 3 pic-slot 0**

- To show AAA statistics accounting details for a specific interface:

  user@host> **show unifed-edge ggsn-pgw aaa statistics accounting detail fpc-slot 3 pic-slot 0**

- To show AAA statistics authentication details for a specific PIC:

  user@host> **show unifed-edge ggsn-pgw aaa statistics authentication detail**

- To show AAA statistics accounting details for a specific PIC:

  user@host> **show unifed-edge ggsn-pgw aaa statistics accounting detail**

- To show AAA statistics accounting details for a specific RADIUS server interface:

  user@host> **show unifed-edge ggsn-pgw aaa statistics radius authentication detail fpc-slot 3 pic-slot 0 name jsimRadius**

- To show AAA statistics accounting details for a specific RADIUS server interface:

  user@host> **show unifed-edge ggsn-pgw aaa radius statistics accounting detail fpc-slot 3 pic-slot 0  name jsimRadius**

- To show network element status lists of the RADIUS servers and their status:

  user@host> **show unified-edge ggsn-pgw aaa network-element status name ne1 fpc-slot 3 pic-slot 0**

  ```
  Network-element: ne1
    Server: radius1, Priority: 1, State: Active
    Server: radius2, Priority: 1, State: Active
    Server: radius3, Priority: 2, State: Active
  ```

The following clear commands are useful for detecting ongoing activity:

- To clear AAA authentication statistics:

  user@host> **clear unifed-edge ggsn-pgw aaa statistics authentication**

- To clear AAA accounting statistics:

  user@host> **clear unifed-edge ggsn-pgw aaa statistics accounting**

- To clear RADIUS server authentication statistics:

  user@host> **clear unifed-edge ggsn-pgw aaa radius statistics authentication**

- To clear RADIUS server accounting statistics:

  user@host> **clear unifed-edge ggsn-pgw aaa radius statistics accounting**

The following test commands are useful for debugging problems:

- To test user authentication:

  user@host> **test unified-edge ggsn-pgw aaa authentication fpc-slot 1 pic-slot 0 profile abc charging-id 0xffffff username aaa password aaa**

- To start an accounting test:

```
user@host> test unified-edge ggsn-pgw aaa accounting fpc-slot 1 pic-slot 0 profile
  abc charging-id 0xffffff start
```

- To stop the accounting test:

```
user@host> test unified-edge ggsn-pgw aaa accounting fpc-slot 1 pic-slot 0 profile
  abc charging-id 0xffffff stop
```

- To test the interim interval configuration:

```
user@host>test unified-edge ggsn-pgw aaa accounting fpc-slot 1 pic-slot 0 profile abc
  charging-id 0xffffff interim
```

PART 10

# Examples

CHAPTER 16

# Example Configurations



## Example: Simple Unified Edge Configuration

This example describes how to configure a simple unified edge, and consists of the following sections:



### Requirements

This example requires the following hardware and software:

- Hardware — MX240, MX480, or MX960 with MOB-MS-DPC
- Software — Junos OS Release 11.2W or later

### Overview and Topology

This example includes the following components:

- SGSN (serving GPRS support node) — The SGSN is the gateway between the mobile user equipment and the core network in a GPRS/UMTS network. Signaling to or from this node is processed on interface ge-2/1/1.

- GGSN (gateway GPRS support node)—The GGSN is responsible for interaction between the GPRS network and external packet-switched networks, such as the Internet. For the external network, the GGSN functions like a router to a subnetwork. The GGSN hides the GPRS infrastructure from the external network. The GGSN is the anchor point that enables the mobility of the user terminal in the GPRS/UMTS network. Its function in GPRS is similar to the home agent in Mobile IP. It maintains the routing necessary to tunnel the protocol data units (PDUs) to the SGSN that services a particular mobile station (MS). It also performs authentication, charging functions, QoS, and policy enforcement.
- Connectivity from the user equipment to external packet data networks

Table 52 on page 512 shows the MobileNext Broadband Gateway components used in this solution.

### Table 52: Unified Edge — Simple Configuration

| Component | Configuration | Settings |
|---|---|---|
| SGSN-facing interface | ge–2/1/1 | 200.6.1.1/24 |
| GGSN | unified-edge ggsn-pgw gateway PGW | **gn interface lo0.0 v4-address 99.1.1.1** Loopback interface for receiving packets from the Packet Forwarding Engine. |
| Mobility control plane | ms-3/0/0 | Services PIC used for processing packets received from the Packet Forwarding Engine. |
| Mobility control plane | ms-3/1/0 | **unit 16000**—Unit required for outgoing packets.<br><br>**unit 0**—One unit required for each APN destination. |
| Mobile address assignment pool | default-ipv4-address-pool | **network 29.0.0.0/8**—Subnet for address assignment to user equipment.<br><br>**range r1**—Named address range.<br><br>**low 29.0.0.1**–Lowest address available.<br><br>**high 29.255.255.254**—Highest address available. |

## Configuration

To configure a simple unified edge environment, perform the following tasks:

- Configuring the Hardware Components for Mobility on page 513
- Configuring the Interface to the Gn Side on page 514

## Configuring the Hardware Components for Mobility

**CLI Quick Configuration**

To quickly configure the chassis for this example, copy the following commands and paste them into the router terminal window:

```
[edit]
load merge /etc/config/mobility-defaults.conf
set chassis fpc 2 forwarding-packages mobility ggsn-pgw
set chassis fpc 3 pic 0 apply-groups mobility
set chassis fpc 3 pic 1 apply-groups mobility
```

**Step-by-Step Procedure**

To configure the chassis options that support the unified edge:

1. Load and merge the default configuration file for the **mobility** group.

   ```
   [edit]
   user@host# load merge /etc/config/mobility-defaults.conf
   ```

2. Configure the forwarding package at the FPC level.

   ```
   [edit]
   user@host# set chassis fpc 2 forwarding-packages mobility ggsn-pgw
   ```

   NOTE: You must include every Packet Forwarding Engine configured with the **ggsn-pgw** forwarding package at the **[edit unified-edge gateways ggsn-pgw *gateway-name* system anchor-pfes]** hierarchy level on the broadband gateway. If you do not specify the Packet Forwarding Engine as an anchor interface, then the Packet Forwarding Engine will not be used by the broadband gateway.

3. Configure the **mobility** group for the services PICs that are processing the packets.

   ```
   [edit]
   user@host# set chassis fpc 3 pic 0 apply-groups mobility
   user@host# set chassis fpc 3 pic 1 apply-groups mobility
   ```

   NOTE: You must include every services PIC configured with the **jservices-mobile** package at the **[edit unified-edge gateways ggsn-pgw *gateway-name* system anchor-spics]** hierarchy level on the broadband gateway. If you do not include the services PIC as an anchor interface, then the services PIC will not be used by the broadband gateway.

### Configuring the Interface to the Gn Side

**CLI Quick Configuration**

To quickly configure the interface to the Gn side (SGW/SGSN signaling), copy the following commands and paste them into the router terminal window:

```
[edit interfaces ge-2/1/1]
set description sgw-em0
set unit 0 family inet address 200.6.1.1/24
```

**Step-by-Step Procedure**

To configure the interface to the SGSN (signaling) function:

1. Identify the interface.

   ```
   user@host# edit interfaces ge-2/1/1
   ```

2. Provide a description that identifies the function of the interface.

   ```
   [edit interfaces ge-2/1/1]
   user@host# set description sgw-em0
   ```

3. Identify the unit and IP address for the interface.

   ```
   [edit interfaces ge-2/1/1]
   user@host# set unit 0 family inet address 200.6.1.1/24
   ```

**Results**

Check the results of the configuration:

```
root@host> show configuration interfaces ge-2/1/1
description sgw-em0;
unit 0 {
    family inet {
        address 200.6.1.1/24;
    }
}
```

### Configuring the Mobile Interface Units for Mobility Support

**CLI Quick Configuration**

To quickly configure the mobile interface units needed to process packets on the services PIC, copy the following commands and paste them into the router terminal window:

```
[edit interfaces mif]
edit interfaces mif
set unit 0 family inet
set unit 1 family inet
set unit 2 family inet
set unit 16000 family inet
```

**Step-by-Step Procedure**

To configure the mobile interface units used to process information packets on the services PIC:

1. Access the mobile interface hierarchy.

   ```
   user@host# edit interfaces mif
   ```

2. Assign one mobile interface for each access point name.

   ```
   [edit interfaces mif]
   user@host# edit interfaces mif
   ```

```
user@host# set unit 0 family inet
user@host# set unit 1 family inet
user@host# set unit 2 family inet
user@host# set unit 16000 family inet description "Reserved mobile interface"
```

**Results** Check the results of the configuration:

```
user@host# edit interfaces mif
user@host# show
unit 0 {
        family inet;
}
unit 1 {
        family inet;
}
unit 2 {
        family inet;
}
unit 16000 {
    description "Reserved mobile interface";
    family inet;
}

user@host# edit configuration interfaces ms-3/1/0
user@host# show
unit 16000 {
        family inet;
}

user@host# edit configuration interfaces mif
user@host# show
unit 0 {
    family inet;
}
unit 1 {
    family inet;
}
unit 16000 {
    family inet;
}
```

## Configuring the Address Pool for Assigning IP Addresses to the User Equipment

**CLI Quick Configuration** To quickly configure the address pool for assigning IP addresses to the user equipment, copy the following commands and paste them into the router terminal window:

```
[edit access address-assignment mobile-pools default-pool family inet network]
user@host# set 29.0.0.0/8 range r1 low 29.0.0.1 high 29.255.255.254
```

**Step-by-Step Procedure** To configure the address pool for assigning IP addresses to user equipment:

1. Create a named pool.

   ```
   user@host# edit access address-assignment mobile-pools
     default-ipv4-address-pool
   ```

2. Optionally, set the pool as the default pool.

   ```
   [edit access address assignment mobile-pools default-ipv4-address-pool ]
   ```

```
user@host# set default-pool
```

3. Set the network address for the pool and a range of available addresses.

```
[edit access address assignment mobile-pools default-ipv4-address-pool ]
user@host# set family inet network 29.0.0.0/8 range r1 low 29.0.0.1 high
  29.255.255.254
```

**Results** Check the results of the configuration:

```
user@host# edit access
user@host# show
access {
    address-assignment {
        mobile-pools {
            default-ipv4-address-pool  {
                family inet {
                    network {
                        29.0.0.0/8 {
                            range {
                                r1 {
                                    low 29.0.0.1;
                                    high 29.255.255.254;
                                }
                            }
                        }
                    }
                    default-pool;
                }
            }
    }
}
```

## Configuring the GGSN Parameters

**CLI Quick Configuration** To quickly configure the GGSN parameters, copy the following statements and paste them into the router terminal window:

```
[edit unified-edge gateways ggsn-pgw PGW]
set home-plmn mcc 421 mnc 342
edit gtp
set gn interface lo0.0 v4-address 99.1.1.1
```

**Step-by-Step Procedure** To define a broadband gateway GTP configuration, from the customer edge to the provider network:

1. Define the broadband gateway as P-GW.

```
user@host# edit unified-edge gateways ggsn-pgw PGW
```

2. Define the home public land mobile network (HPLMN), mobile country code (MCC), and mobile network code (MNC).

```
[edit unified-edge gateways ggsn-pgw PGW]
user@host# set home-plmn mcc 421 mnc 342
```

3. Configure the GTP settings.

```
user@host# edit unified-edge gateways ggsn-pgw PGW gtp
```

4. Configure the Gn interface for receiving GTP-C and GTP-U packets on the GGSN to use the loopback interface and IP address specified.

```
[edit unified-edge gateways ggsn-pgw PGW gtp ]
user@host# set gn interface lo0.0 v4-address 99.1.1.1
```

**Results** Check the results of the configuration:

```
user@host# edit unified-edge
user@host# show
unified-edge {
    gateways {
        ggsn-pgw PGW {
            gtp {
                path-management disable;
                gn {
                    interface lo0.0 v4-address 99.1.1.1;
                }
                traceoptions {
                    file gtp_local size 1m;
                    level all;
                    flag all;
                }
            }
            home-plmn mcc 421 mnc 342;
        }
    }
}
```

## Verification

To confirm that the configuration is working properly, perform the following tasks:

- Verifying the Mobile Address Pool on page 517
- Verifying the Gateway Configuration on page 518

### Verifying the Mobile Address Pool

**Purpose** Verify the mobile pool address assignments.

**Action**

```
user@host# show access address-assignment mobile-pools default-ipv4-address-pool
family inet {
    network {
        29.0.0.0/8 {
            range {
                r1 {
                    low 29.0.0.1;
                    high 29.255.255.254;
                }
            }
        }
    }
}
default-pool;
```

**Meaning** The output shows the subnet and available address ranges for the mobile pool.

### Verifying the Gateway Configuration

**Purpose** Verify the configuration of the GGSN/P-GW gateways.

**Action**

```
user@host# show unified-edge gateways
ggsn-pgw PGW {
    gtp {
        path-management disable;
        gn {
            interface lo0.0 v4-address 200.6.88.1;
        }
        s5 {
            interface lo0.0 v4-address 200.6.88.1;
        }
    }
    home-plmn {
        mcc 421 mnc 342;
    }
}
```

**Related Documentation**

- Configuring GTP Services Overview on page 234
- Configuring a Local Policy on page 354
- Configuring GTP Trace Options on page 255
- Configuring GTP Services on the Gn Interface on page 244
- Configuring a Loopback Interface for Transport of GTP Packets on page 236

## Example: Configuring MobileNext Broadband Gateway

This example describes how to configure the MobileNext Broadband Gateway without any provider edge functionality.



### Requirements

This example uses the following hardware and software components:

- Junos OS Release 11.2W
- Juniper Networks MobileNext Broadband Gateway

### Overview

This example describes how to configure the broadband gateway without any provider edge functionality. VPN routing and forwarding (VRF) is used to support the following configuration:

- 3GPP interfaces (Gn and S5) are in the same VRF.
- 3GPP interfaces (Gp and S8) are in the same VRF.
- Gi interfaces (Gi, SGi) to the external networks are in their own VRF named VRF-wireless1.juniper.net and VRF-wireless2.juniper.net, respectively.
- RADIUS server is in its own VRF called RADIUS.
- Charging (Ga) is in its own VRF called CGF.
- DHCPv4 and DHCPv6 proxy clients are in their own VRF called DHCP.

### Table 53: Components of the Broadband Gateway

| Property | Settings | Description |
|---|---|---|
| Loopback address | lo0 11.11.11.1/32<br>lo0 11.11.11.2/32<br>lo0 11.11.11.3/32<br>lo0 11.11.11.11/32<br>lo0 11.11.11.12/32<br>lo0 11.11.11.13/32 | Identifies the device for communications. |
| Routing protocol | isis<br>bgp group | Indicates the device is using IS-IS and BGP as routing protocols. |
| MPLS protocol and LSP definition | mpls<br>label-switched-path pe1-to-pe2 to 10.255.28.17 | Indicates the device is using the MPLS protocol with the specified LSP to reach the other core device (pe2). |
| RSVP | rsvp<br>lo0.0 | Indicates the device is using RSVP. The statement must specify the loopback address and the core interfaces that will be used for the RSVP session. |
| Interface family | family inet<br>family iso<br>family mpls | The logical units of the core interfaces belong to family inet, family iso, and family mpls. |
| Core interfaces | ge-5/2/0.0 with IP address 33.33.0.1/16<br>ge-5/2/1.0 with IP address 33.44.0.1/16<br>ge-5/3/0.0 with IP address 33.55.0.1/16<br>ge-5/3/1.0 with IP address 33.66.0.1/16 | |
| Gi interface | ge-0/0/0 with IP address 44.44.0.1/16 | |
| Gn interface | ge-5/1/0 with IP address 22.5.0.1/16 | |

Table 53: Components of the Broadband Gateway *(continued)*

| Property | Settings | Description |
|---|---|---|
| CGF VRF | ge-0/0/6.0 with IP address 2.2.2.1/16<br>lo0.2, lo0.12 | |
| RADIUS VRF | ge-0/0/7.0 with IP address 3.3.3.1/16<br>lo0.11 | |
| DHCP VRF | ge-0/0/8.0 with IP address 4.4.4.1/16<br>lo0.13 | |
| VRF-wireless1.juniper.net | mif.1 | |
| VRF-wireless2.juniper.net | ge-0/0/0.0<br>mif.2 | |

## Configuration



### Configuring the Chassis

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set chassis redundancy graceful-switchover
set system commit synchronize
load merge /etc/config/mobility-defaults.conf
set chassis fpc 1 pic 0 apply-groups mobility
set chassis fpc 1 pic 1 apply-groups mobility
```

```
set chassis fpc 3 pic 0 apply-groups mobility
set chassis fpc 3 pic 1 apply-groups mobility
set chassis fpc 0 forwarding-packages mobility ggsn-pgw
set chassis fpc 5 forwarding-packages mobility ggsn-pgw
set interfaces lo0 unit 1 family inet address 11.11.11.1/32
set interfaces lo0 unit 2 family inet address 11.11.11.2/32
set interfaces lo0 unit 3 family inet address 11.11.11.3/32
set interfaces lo0 unit 11 family inet address 11.11.11.11/32
set interfaces lo0 unit 12 family inet address 11.11.11.12/32
set interfaces lo0 unit 13 family inet address 11.11.11.13/32
```

**Step-by-Step Procedure**

To configure the chassis:

1. Enable graceful restart for Routing Engine redundancy.

   ```
   [edit]
   user@pe1# set chassis redundancy graceful-switchover
   ```

2. Load and merge the default configuration file for the **mobility** group.

   ```
   [edit]
   user@pe1# load merge /etc/config/mobility-defaults.conf
   ```

3. Configure the **mobility** group on the session DPCs.

   ```
   [edit]
   user@pe1# set chassis fpc 1 pic 0 apply-groups mobility
   user@pe1# set chassis fpc 1 pic 1 apply-groups mobility
   user@pe1# set chassis fpc 3 pic 0 apply-groups mobility
   user@pe1# set chassis fpc 3 pic 1 apply-groups mobility
   ```

   NOTE: You must include every services PIC configured with the **jservices-mobile** package at the **[edit unified-edge gateways ggsn-pgw *gateway-name* system anchor-spics]** hierarchy level on the broadband gateway. If you do not include the services PIC as an anchor interface, then the services PIC will not be used by the broadband gateway.

4. Configure the interface DPC or MPC at the FPC level.

   ```
   [edit]
   user@pe1# set chassis fpc 0 forwarding-packages mobility ggsn-pgw
   user@pe1# set chassis fpc 5 forwarding-packages mobility ggsn-pgw
   ```

   NOTE: You must include every Packet Forwarding Engine configured with the **ggsn-pgw** forwarding package at the **[edit unified-edge gateways ggsn-pgw *gateway-name* system anchor-pfes]** hierarchy level on the broadband gateway. If you do not specify the Packet Forwarding Engine as an anchor interface, then the Packet Forwarding Engine will not be used by the broadband gateway.

5. Configure loopback interfaces.

```
[edit]
user@pe1# set interfaces lo0 unit 1 family inet address 11.11.11.1/32
user@pe1# set interfaces lo0 unit 2 family inet address 11.11.11.2/32
user@pe1# set interfaces lo0 unit 3 family inet address 11.11.11.3/32
user@pe1# set interfaces lo0 unit 11 family inet address 11.11.11.11/32
user@pe1# set interfaces lo0 unit 12 family inet address 11.11.11.12/32
user@pe1# set interfaces lo0 unit 13 family inet address 11.11.11.13/32
```

### Configuring the IPv4 Interfaces

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set interfaces ge-0/0/0 unit 0 family inet address 44.44.0.1/16
set interfaces ge-0/0/6 unit 0 family inet address 2.2.2.1/16
set interfaces ge-0/0/7 unit 0 family inet address 3.3.3.1/16
set interfaces ge-0/0/8 unit 0 family inet address 4.4.4.1/16
set interfaces ge-5/1/0 unit 0 family inet address 22.5.0.1/16
set interfaces ge-5/2/0 unit 0 family inet address 33.33.0.1/16
set interfaces ge-5/2/1 unit 0 family inet address 33.44.0.1/16
set interfaces ge-5/3/0 unit 0 family inet address 33.55.0.1/16
set interfaces ge-5/3/1 unit 0 family inet address 33.66.0.1/16
```

**Step-by-Step Procedure**

To configure the IPv4 interfaces:

1. Configure IPv4 interfaces for the Gi interface.

   ```
   [edit]
   user@pe1# set interfaces ge-0/0/0 unit 0 family inet address 44.44.0.1/16
   ```

2. Configure IPv4 interfaces for the Gn interfaces.

   ```
   [edit]
   user@pe1# set interfaces ge-5/1/0 unit 0 family inet address 22.5.0.1/16
   ```

3. Configure IPv4 interfaces for core routing.

   ```
   [edit]
   user@pe1# set interfaces ge-5/2/0 unit 0 family inet address 33.33.0.1/16
   user@pe1# set interfaces ge-5/2/1 unit 0 family inet address 33.44.0.1/16
   user@pe1# set interfaces ge-5/3/0 unit 0 family inet address 33.55.0.1/16
   user@pe1# set interfaces ge-5/3/1 unit 0 family inet address 33.66.0.1/16
   ```

4. Configure IPv4 interfaces for the charging, RADIUS, and DHCP VRFs.

   ```
   [edit]
   user@pe1# set interfaces ge-0/0/6 unit 0 family inet address 2.2.2.1/16
   user@pe1# set interfaces ge-0/0/7 unit 0 family inet address 3.3.3.1/16
   user@pe1# set interfaces ge-0/0/8 unit 0 family inet address 4.4.4.1/16
   ```

### Enabling IS-IS

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
```

```
set interfaces ge-5/2/0 unit 0 family iso
set interfaces ge-5/2/1 unit 0 family iso
set interfaces ge-5/3/0 unit 0 family iso
set interfaces ge-5/3/1 unit 0 family iso
top
set protocols isis interface ge-5/2/0.0
set protocols isis interface ge-5/2/1.0
set protocols isis interface ge-5/3/0.0
set protocols isis interface ge-5/3/1.0
set protocols isis interface lo0.0
```

**Step-by-Step Procedure**

To enable IS-IS routing:

1. Configure the ISO family on interfaces running IS-IS.

```
[edit]
user@pe1# set interfaces ge-5/2/0 unit 0 family iso
user@pe1# set interfaces ge-5/2/1 unit 0 family iso
user@pe1# set interfaces ge-5/3/0 unit 0 family iso
user@pe1# set interfaces ge-5/3/1 unit 0 family iso
```

2. Create the IS-IS interface.

```
[edit]
user@pe1# set protocols isis interface ge-5/2/0.0
user@pe1# set protocols isis interface ge-5/2/1.0
user@pe1# set protocols isis interface ge-5/3/0.0
user@pe1# set protocols isis interface ge-5/3/1.0
```

3. Configure a network entity title on the loopback interface.

```
[edit]
user@pe1# set protocols isis interface lo0.0
```

## Enabling MPLS and RSVP Routing

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set interfaces ge-5/2/0 unit 0 family mpls
set interfaces ge-5/2/1 unit 0 family mpls
set interfaces ge-5/3/0 unit 0 family mpls
set interfaces ge-5/3/1 unit 0 family mpls
set protocols rsvp interface ge-5/2/0.0
set protocols rsvp interface ge-5/2/1.0
set protocols rsvp interface ge-5/3/0.0
set protocols rsvp interface ge-5/3/1.0
set protocols rsvp interface lo0.0
set protocols mpls explicit-null
set protocols mpls label-switched-path PE-1-to-PE-2 to 10.255.28.17
set protocols mpls interface ge-5/3/1.0
set protocols mpls interface ge-5/3/0.0
set protocols mpls interface ge-5/2/0.0
set protocols mpls interface ge-5/2/1.0
```

**Step-by-Step Procedure**

To enable MPLS and RSVP:

1. Configure the interfaces with MPLS enabled.

```
[edit]
user@pe1# set interfaces ge-5/2/0 unit 0 family mpls
user@pe1# set interfaces ge-5/2/1 unit 0 family mpls
user@pe1# set interfaces ge-5/3/0 unit 0 family mpls
user@pe1# set interfaces ge-5/3/1 unit 0 family mpls
```

2. Include the interfaces in the MPLS and RSVP protocol configuration.

```
[edit]
user@pe1# set protocols rsvp interface ge-5/2/0.0
user@pe1# set protocols rsvp interface ge-5/2/1.0
user@pe1# set protocols rsvp interface ge-5/3/0.0
user@pe1# set protocols rsvp interface ge-5/3/1.0
user@pe1# set protocols rsvp interface lo0.0
user@pe1# set protocols mpls interface ge-5/2/0.0
user@pe1# set protocols mpls interface ge-5/2/1.0
user@pe1# set protocols mpls interface ge-5/3/0.0
user@pe1# set protocols mpls interface ge-5/3/1.0
```

3. In the MPLS configuration, advertise label 0 and specify the LSP used for dynamic MPLS.

```
[edit]
user@pe1# set protocols mpls explicit-null
user@pe1# set protocols mpls label-switched-path PE-1-to-PE-2 to 10.255.28.17
```

## Configuring BGP

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set routing-options nonstop-routing
set routing-options router-id 10.102.32.59
set routing-options autonomous-system 69
set routing-options forwarding-table export pplb
set protocols bgp group L3VPN-Sig type internal
set protocols bgp group L3VPN-Sig local-address 10.102.32.59
set protocols bgp group L3VPN-Sig family inet-vpn any
set protocols bgp group L3VPN-Sig neighbor 10.255.28.17
```

**Step-by-Step Procedure**

To configure BGP:

1. Configure the routing options.

```
[edit]
user@pe1# set routing-options nonstop-routing
user@pe1# set routing-options router-id 10.102.32.59
user@pe1# set routing-options autonomous-system 69
user@pe1# set routing-options forwarding-table export pplb
```

2. Configure the BGP group for Layer 3 VPNs.

```
[edit]
```

```
user@pe1# set protocols bgp group L3VPN-Sig type internal
user@pe1# set protocols bgp group L3VPN-Sig local-address 10.102.32.59
user@pe1# set protocols bgp group L3VPN-Sig family inet-vpn any
user@pe1# set protocols bgp group L3VPN-Sig neighbor 10.255.28.17
```

### Enabling the Routing Instance for the Layer 3 VPN

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set routing-instances VRF-wireless1.juniper.net instance-type vrf
set routing-instances VRF-wireless1.juniper.net route-distinguisher 10.102.32.59:512
set routing-instances VRF-wireless1.juniper.net vrf-target target:5000:1012
set routing-instances VRF-wireless1.juniper.net vrf-table-label
```

**Step-by-Step Procedure**

To configure the routing instance for the VRF used in the Layer 3 VPN:

1. Specify VRF as the type.

```
[edit]
user@pe1# set routing-instances VRF-wireless1.juniper.net instance-type vrf
```

2. Configure the Layer 3 VPN routing instance.

```
[edit]
user@pe1# set routing-instances VRF-wireless1.juniper.net route-distinguisher
  10.102.32.59:512
user@pe1# set routing-instances VRF-wireless1.juniper.net vrf-target
  target:5000:1012
user@pe1# set routing-instances VRF-wireless1.juniper.net vrf-table-label
```

### Configuring RADIUS Servers

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set access radius servers radius_server address 3.3.3.2
set access radius servers radius_server secret "$9$TF6ABIcvWxp0WxNdg4QFn"
set access radius servers radius_server accounting-secret
  "$9$TQ6Apu1hyKO1b2aU.mO1REclKM8"
set access radius servers radius_server source-interface lo0.11
set access radius servers radius_server source-interface ipv4-address 11.11.11.11
set access radius network-elements radius_ne server radius_server
set routing-instances RADIUS instance-type virtual-router
set routing-instances RADIUS interface ge-0/0/7.0
set routing-instances RADIUS interface lo0.11
```

**Step-by-Step Procedure**

To configure the RADIUS servers to interact with the broadband gateway:

1. Configure the RADIUS server.

```
[edit]
user@pe1# set access radius servers radius_server address 3.3.3.2
```

```
user@pe1# set access radius servers radius_server secret
  "$9$TF6ABIcvWxp0WxNdg4QFn"
user@pe1# set access radius servers radius_server accounting-secret
  "$9$TQ6Apu1hyKO1b2aU.mO1REclKM8"
user@pe1# set access radius servers radius_server source-interface lo0.11
  ipv4-address 11.11.11.11
```

2. Specify the RADIUS server as a network element.

```
[edit]
user@pe1# set access radius network-elements radius_ne server radius_server
```

3. Specify the routing instance for the RADIUS accounting server.

```
[edit]
user@pe1# set routing-instances RADIUS instance-type virtual-router
user@pe1# set routing-instances RADIUS interface ge-0/0/7.0
user@pe1# set routing-instances RADIUS interface lo0.11
```

## Configuring DHCP Proxy Clients

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set routing-instances DHCP instance-type virtual-router
set routing-instances DHCP system services dhcp-proxy-client dhcpv4-profiles dhcp-1
  bind-interface ge-0/0/8.0
set routing-instances DHCP system services dhcp-proxy-client dhcpv4-profiles dhcp-1
  servers 4.4.4.2 priority 1
set routing-instances DHCP system services dhcp-proxy-client dhcpv4-profiles dhcp-1
  servers 4.4.4.3 priority 2
set routing-instances DHCP interface ge-0/0/8.0
set routing-instances DHCP interface lo0.13
```

**Step-by-Step Procedure**

To configure DHCP proxies:

1. Configure the DHCP proxy clients by associating them with the host interface and prioritized DHCP servers.

```
[edit]
user@pe1# set routing-instances DHCP system services dhcp-proxy-client
  dhcpv4-profiles dhcp-1 bind-interface ge-0/0/8.0
user@pe1# set routing-instances DHCP system services dhcp-proxy-client
  dhcpv4-profiles dhcp-1 servers 4.4.4.2 priority 1
user@pe1# set routing-instances DHCP system services dhcp-proxy-client
  dhcpv4-profiles dhcp-1 servers 4.4.4.3 priority 2
```

2. Specify the routing instance for the DHCP server.

```
[edit]
user@pe1# set routing-instances DHCP instance-type virtual-router
user@pe1# set routing-instances DHCP interface ge-0/0/8.0
user@pe1# set routing-instances DHCP interface lo0.13
```

## Enabling the APN Configuration

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set interfaces mif unit 1 family inet
set interfaces mif unit 2 family inet
set interfaces ms-1/1/0 unit 16000 family inet
set interfaces ms-3/1/0 unit 16000 family inet
set routing-instances VRF-wireless1.juniper.net instance-type vrf
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.100.0.0/16 range r1 low 100.100.0.0
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.100.0.0/16 range r1 high 100.100.255.255
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 200.200.0.0/16
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.102.0.0/16 range r2 low 100.102.0.0
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.102.0.0/16 range r2 high 100.102.255.255
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.103.0.0/16 range r3 low 100.103.0.0
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.103.0.0/16 range r3 high 100.103.255.255
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.104.0.0/16 range r4 low 100.104.0.0
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.104.0.0/16 range r4 high 100.104.255.255
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.105.0.0/16 range r5 low 100.105.0.0
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.105.0.0/16 range r5 high 100.105.255.255
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.106.0.0/16 range r6 low 100.106.0.0
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.106.0.0/16 range r6 high 100.106.255.255
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.107.0.0/16 range r7 low 100.107.0.0
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.107.0.0/16 range r7 high 100.107.255.255
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.108.0.0/16 range r8 low 100.108.0.0
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.108.0.0/16 range r8 high 100.108.255.255
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.109.0.0/16 range r9 low 100.109.0.0
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.109.0.0/16 range r9 high 100.109.255.255
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.110.0.0/16 range r10 low 100.110.0.0
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.110.0.0/16 range r10 high 100.110.255.255
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.111.0.0/16 range r11 low 100.111.0.0
```

```
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.111.0.0/16 range r11 high 100.111.255.255
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.112.0.0/16 range r12 low 100.112.0.0
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.112.0.0/16 range r12 high 100.112.255.255
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.113.0.0/16 range r13 low 100.113.0.0
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.113.0.0/16 range r13 high 100.113.255.255
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.114.0.0/16 range r14 low 100.114.0.0
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.114.0.0/16 range r14 high 100.114.255.255
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.115.0.0/16 range r15 low 100.115.0.0
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.115.0.0/16 range r15 high 100.115.255.255
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.116.0.0/16 range r16 low 100.116.0.0
set routing-instances VRF-wireless1.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.116.0.0/16 range r16 high 100.116.255.255
set routing-instances VRF-wireless2.juniper.net instance-type virtual-router
set routing-instances VRF-wireless2.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.100.0.0/16 range r1 low 100.100.0.0
set routing-instances VRF-wireless2.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 100.100.0.0/16 range r1 high 100.100.255.255
set routing-instances VRF-wireless2.juniper.net access address-assignment mobile-pools
  wireless-juniper1 family inet network 200.200.0.0/16
set routing-instances VRF-wireless2.juniper.net interface ge-0/0/0.0
set routing-instances VRF-wireless2.juniper.net interface mif.2
```

**Step-by-Step Procedure**

To enable the APN configuration:

1. Create mobile interfaces.

```
[edit]
user@pe1# set interfaces mif unit 1 family inet
user@pe1# set interfaces mif unit 2 family inet
user@pe1# set interfaces ms-1/1/0 unit 16000 family inet
user@pe1# set interfaces ms-3/1/0 unit 16000 family inet
```

2. Configure the VRF-wireless1.juniper.net routing instance.

```
[edit]
user@pe1# edit routing-instances VRF-wireless1.juniper.net
```

3. Specify the IP pool configuration for the VRF-wireless1.juniper.net routing instance.

```
[edit routing-instances VRF-wireless1.juniper.net]
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.100.0.0/16 range r1 low 100.100.0.0
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.100.0.0/16 range r1 high 100.100.255.255
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 200.200.0.0/16
```

```
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.102.0.0/16 range r2 low 100.102.0.0
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.102.0.0/16 range r2 high 100.102.255.255
user@pe1# set address-assignment mobile-pools wireless-juniper1 family inet
  network 100.103.0.0/16 range r2 low 100.103.0.0
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.103.0.0/16 range r2 high 100.103.255.255
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.104.0.0/16 range r2 low 100.104.0.0
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.104.0.0/16 range r2 high 100.104.255.255
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.105.0.0/16 range r2 low 100.105.0.0
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.105.0.0/16 range r2 high 100.105.255.255
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.106.0.0/16 range r2 low 100.106.0.0
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.106.0.0/16 range r2 high 100.106.255.255
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.107.0.0/16 range r2 low 100.107.0.0
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.107.0.0/16 range r2 high 100.107.255.255
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.108.0.0/16 range r2 low 100.108.0.0
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.108.0.0/16 range r2 high 100.108.255.255
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.109.0.0/16 range r2 low 100.109.0.0
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.109.0.0/16 range r2 high 100.109.255.255
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.110.0.0/16 range r2 low 100.110.0.0
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.110.0.0/16 range r2 high 100.110.255.255
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.111.0.0/16 range r2 low 100.111.0.0
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.111.0.0/16 range r2 high 100.111.255.255
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.112.0.0/16 range r2 low 100.112.0.0
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.112.0.0/16 range r2 high 100.112.255.255
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.113.0.0/16 range r2 low 100.113.0.0
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.113.0.0/16 range r2 high 100.113.255.255
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.114.0.0/16 range r2 low 100.114.0.0
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.114.0.0/16 range r2 high 100.114.255.255
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.115.0.0/16 range r2 low 100.115.0.0
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.115.0.0/16 range r2 high 100.115.255.255
```

```
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.116.0.0/16 range r2 low 100.116.0.0
user@pe1# set access address-assignment mobile-pools wireless-juniper1 family
  inet network 100.116.0.0/16 range r2 high 100.116.255.255
```

4. Configure the IP pool configuration for the VRF-wireless2.juniper.net routing instance.

```
[edit routing-instances VRF-wireless2.juniper.net]
user@pe1# set routing-instances VRF-wireless2.juniper.net access
  address-assignment mobile-pools wireless-juniper1 family inet network
  100.100.0.0/16 range r1 low 100.100.0.0
user@pe1# set routing-instances VRF-wireless2.juniper.net access
  address-assignment mobile-pools wireless-juniper1 family inet network
  100.100.0.0/16 range r1 high 100.100.255.255
user@pe1# set routing-instances VRF-wireless2.juniper.net access
  address-assignment mobile-pools wireless-juniper1 family inet network
  200.200.0.0/16
user@pe1# set routing-instances VRF-wireless2.juniper.net interface ge-0/0/0.0
user@pe1# set routing-instances VRF-wireless2.juniper.net interface mif.2
```

## Configuring Offline Charging

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set routing-instances CHR-VRF instance-type vrf
set routing-instances CHR-VRF interface lo0.12
set routing-instances CHR-VRF route-distinguisher 10.102.32.59:1000
set routing-instances CHR-VRF vrf-target target:5000:1000
set routing-instances CHR-VRF vrf-table-label
set routing-instances CHR-VRF-Local instance-type virtual-router
set routing-instances CHR-VRF-Local interface ge-0/0/6.0
set routing-instances CHR-VRF-Local interface lo0.2
set unified-edge gateways ggsn-pgw MBG1 charging cdr-profiles cdr-wireless1.juniper.net
  enable-reduced-partial-cdrs
set unified-edge gateways ggsn-pgw MBG1 charging trigger-profiles CGW-trig-pro-1 offline
  volume-limit 1048576
set unified-edge gateways ggsn-pgw MBG1 charging trigger-profiles CGW-trig-pro-1 offline
  volume-limit direction both
set unified-edge gateways ggsn-pgw MBG1 charging trigger-profiles
  trigr-wireless1.juniper.net offline volume-limit 1048576
set unified-edge gateways ggsn-pgw MBG1 charging trigger-profiles
  trigr-wireless1.juniper.net offline volume-limit direction uplink
set unified-edge gateways ggsn-pgw MBG1 charging transport-profiles CGW-trans-pro-1
  offline charging-gateways cdr-release r7
set unified-edge gateways ggsn-pgw MBG1 charging transport-profiles CGW-trans-pro-1
  offline charging-gateways peer-order peer my_cgf
set unified-edge gateways ggsn-pgw MBG1 charging transport-profiles CGW-trans-pro-1
  offline charging-gateways peer-order peer local_cgw
set unified-edge gateways ggsn-pgw MBG1 charging transport-profiles CGW-trans-pro-1
  offline charging-gateways switch-back-time 1
set unified-edge gateways ggsn-pgw MBG1 charging transport-profiles
  trans-wireless1.juniper.net offline charging-gateways cdr-release r7
```

```
set unified-edge gateways ggsn-pgw MBG1 charging transport-profiles
  trans-wireless1.juniper.net offline charging-gateways persistent-storage-order
  local-storage
set unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options
  file-age 60
set unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options
  file-format raw-asn
set unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options
  disk-space-policy water-mark-level1 percentage 70
set unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options
  disk-space-policy water-mark-level2 percentage 80
set unified-edge gateways ggsn-pgw MBG1 charging local-persistent-storage-options
  disk-space-policy water-mark-level3 percentage 90
set unified-edge gateways ggsn-pgw MBG1 charging charging-profiles CGW-chr-pro-1
  profile-id 2
set unified-edge gateways ggsn-pgw MBG1 charging charging-profiles CGW-chr-pro-1
  transport-profile CGW-trans-pro-1
set unified-edge gateways ggsn-pgw MBG1 charging charging-profiles CGW-chr-pro-1
  trigger-profile CGW-trig-pro-1
set unified-edge gateways ggsn-pgw MBG1 charging charging-profiles
  chr-wireless1.juniper.net profile-id 1
set unified-edge gateways ggsn-pgw MBG1 charging charging-profiles
  chr-wireless1.juniper.net transport-profile trans-wireless1.juniper.net
set unified-edge gateways ggsn-pgw MBG1 charging charging-profiles
  chr-wireless1.juniper.net cdr-profile cdr-wireless1.juniper.net
set unified-edge gateways ggsn-pgw MBG1 charging charging-profiles
  chr-wireless1.juniper.net trigger-profile trigr-wireless1.juniper.net
set unified-edge gateways ggsn-pgw MBG1 charging gtpp transport-protocol tcp
set unified-edge gateways ggsn-pgw MBG1 charging gtpp version v0
set unified-edge gateways ggsn-pgw MBG1 charging gtpp header-type long
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer local_cgw
  destination-ipv4-address 42.42.0.2
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer local_cgw source-interface
  lo0.2
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer local_cgw source-interface
  ipv4-address 11.11.11.2
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer local_cgw destination-port
  3386
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer local_cgw transport-protocol
  tcp
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer local_cgw n3-requests 1
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer local_cgw t3-response 3
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer local_cgw header-type long
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer local_cgw
  pending-queue-size 1000
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer my_cgf
  destination-ipv4-address 41.41.0.2
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer my_cgf source-interface
  lo0.12
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer my_cgf source-interface
  ipv4-address 11.11.11.12
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer my_cgf destination-port
  3386
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer my_cgf transport-protocol
  tcp
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer my_cgf n3-requests 1
```

```
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer my_cgf t3-response 5
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer my_cgf header-type long
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer my_cgf pending-queue-size
  1000
```

**Step-by-Step Procedure**

To configure the offline charging profile:

1. Create the routing instances for charging. CHR-VRF is for the external charging gateway and CHR-VRF-Local is for persistent local storage.

   ```
   [edit]
   user@pe1# set routing-instances CHR-VRF instance-type vrf
   user@pe1# set routing-instances CHR-VRF interface lo0.12
   user@pe1# set routing-instances CHR-VRF route-distinguisher 10.102.32.59:1000
   user@pe1# set routing-instances CHR-VRF vrf-target target:5000:1000
   user@pe1# set routing-instances CHR-VRF vrf-table-label
   user@pe1# set routing-instances CHR-VRF-Local instance-type virtual-router
   user@pe1# set routing-instances CHR-VRF-Local interface ge-0/0/6.0
   user@pe1# set routing-instances CHR-VRF-Local interface lo0.2
   ```

2. Configure charging for the GGSN called MBG1.

   ```
   [edit]
   user@pe1# edit unified-edge gateways ggsn-pgw MBG1 charging
   ```

3. Specify the global GTP Prime properties to transmit CDRs to the external charging gateway.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging]
   user@pe1# set gtpp transport-protocol tcp
   user@pe1# set gtpp version v0
   user@pe1# set gtpp header-type long
   ```

4. Specify the GTP Prime properties for the GTP Prime peers.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging]
   user@pe1# set gtpp peer local_cgw destination-ipv4-address 42.42.0.2
   user@pe1# set gtpp peer local_cgw source-interface lo0.2
   user@pe1# set gtpp peer local_cgw source-interface ipv4-address 11.11.11.2
   user@pe1# set gtpp peer local_cgw destination-port 3386
   user@pe1# set gtpp peer local_cgw transport-protocol tcp
   user@pe1# set gtpp peer local_cgw n3-requests 1
   user@pe1# set gtpp peer local_cgw t3-response 3
   user@pe1# set gtpp peer local_cgw header-type long
   user@pe1# set gtpp peer local_cgw pending-queue-size 1000
   user@pe1# set gtpp peer my_cgf destination-ipv4-address 41.41.0.2
   user@pe1# set gtpp peer my_cgf source-interface lo0.12
   user@pe1# set gtpp peer my_cgf source-interface ipv4-address 11.11.11.12
   user@pe1# set gtpp peer my_cgf destination-port 3386
   user@pe1# set gtpp peer my_cgf transport-protocol tcp
   user@pe1# set gtpp peer my_cgf n3-requests 1
   user@pe1# set gtpp peer my_cgf t3-response 5
   user@pe1# set gtpp peer my_cgf header-type long
   user@pe1# set gtpp peer my_cgf pending-queue-size 1000
   ```

5. Configure local persistent storage of the CDRs.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 charging]
   user@pe1# set local-persistent-storage-options file-age 60
   ```

```
user@pe1# set local-persistent-storage-options file-format raw-asn
user@pe1# set local-persistent-storage-options disk-space-policy water-mark-level1
  percentage 70
user@pe1# set local-persistent-storage-options disk-space-policy water-mark-level2
  percentage 80
user@pe1# set local-persistent-storage-options disk-space-policy water-mark-level3
  percentage 90
```

6. Configure the transport, trigger, and CDR profiles referenced by the charging profile for offline charging.

```
[edit unified-edge gateways ggsn-pgw MBG1 charging]
user@pe1# set transport-profiles CGW-trans-pro-1 offline charging-gateways
  cdr-release r7
user@pe1# set transport-profiles CGW-trans-pro-1 offline charging-gateways
  peer-order peer my_cgf
user@pe1# set transport-profiles CGW-trans-pro-1 offline charging-gateways
  peer-order peer local_cgw
user@pe1# set transport-profiles CGW-trans-pro-1 offline charging-gateways
  switch-back-time 1
user@pe1# set transport-profiles trans-wireless1.juniper.net offline
  charging-gateways cdr-release r7
user@pe1# set transport-profiles trans-wireless1.juniper.net offline
  charging-gateways persistent-storage-order local-storage
user@pe1# set trigger-profiles CGW-trig-pro-1 offline volume-limit 1048576
user@pe1# set trigger-profiles CGW-trig-pro-1 offline volume-limit direction both
user@pe1# set trigger-profiles trigr-wireless1.juniper.net offline volume-limit 1048576
user@pe1# set trigger-profiles trigr-wireless1.juniper.net offline volume-limit direction
  uplink
user@pe1# set cdr-profiles cdr-wireless1.juniper.net enable-reduced-partial-cdrs
```

7. Configure the charging profile. The CGW-chr-pro-1 charging profile is used for the external charging gateway, while the chr-wireless1.juniper.net charging profile is used for local persistent storage.

```
[edit unified-edge gateways ggsn-pgw MBG1 charging]
user@pe1# set charging-profiles CGW-chr-pro-1 profile-id 2
user@pe1# set charging-profiles CGW-chr-pro-1 transport-profile CGW-trans-pro-1
user@pe1# set charging-profiles CGW-chr-pro-1 trigger-profile CGW-trig-pro-1
user@pe1# set charging-profiles chr-wireless1.juniper.net profile-id 1
user@pe1# set charging-profiles chr-wireless1.juniper.net transport-profile
  trans-wireless1.juniper.net
user@pe1# set charging-profiles chr-wireless1.juniper.net cdr-profile
  cdr-wireless1.juniper.net
user@pe1# set charging-profiles chr-wireless1.juniper.net trigger-profiles
  trigr-wireless1.juniper.net
user@pe1# set charging-profiles chr-wireless1.juniper.net trigger-profile
  trigr-wireless1.juniper.net
```

## Configuring GTP Services

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways ggsn-pgw MBG1 gtp gn interface lo0.1
```

```
set unified-edge gateways ggsn-pgw MBG1 gtp gn interface v4-address 11.11.11.1
set unified-edge gateways ggsn-pgw MBG1 gtp gn n3-requests 3
set unified-edge gateways ggsn-pgw MBG1 gtp gn t3-response 3
set unified-edge gateways ggsn-pgw MBG1 gtp gn echo-interval 60
set unified-edge gateways ggsn-pgw MBG1 gtp gn path-management enable
set unified-edge gateways ggsn-pgw MBG1 gtp gp interface lo0.1
set unified-edge gateways ggsn-pgw MBG1 gtp gp interface v4-address 11.11.11.1
set unified-edge gateways ggsn-pgw MBG1 gtp gp n3-requests 3
set unified-edge gateways ggsn-pgw MBG1 gtp gp t3-response 3
set unified-edge gateways ggsn-pgw MBG1 gtp gp echo-interval 60
set unified-edge gateways ggsn-pgw MBG1 gtp gp path-management enable
set unified-edge gateways ggsn-pgw MBG1 gtp s5 interface lo0.1
set unified-edge gateways ggsn-pgw MBG1 gtp s5 interface v4-address 11.11.11.1
set unified-edge gateways ggsn-pgw MBG1 gtp s5 n3-requests 3
set unified-edge gateways ggsn-pgw MBG1 gtp s5 t3-response 3
set unified-edge gateways ggsn-pgw MBG1 gtp s5 echo-interval 60
set unified-edge gateways ggsn-pgw MBG1 gtp s5 path-management enable
set unified-edge gateways ggsn-pgw MBG1 gtp s8 interface lo0.1
set unified-edge gateways ggsn-pgw MBG1 gtp s8 interface v4-address 11.11.11.1
set unified-edge gateways ggsn-pgw MBG1 gtp s8 n3-requests 3
set unified-edge gateways ggsn-pgw MBG1 gtp s8 t3-response 3
set unified-edge gateways ggsn-pgw MBG1 gtp s8 echo-interval 60
set unified-edge gateways ggsn-pgw MBG1 gtp s8 path-management enable
```

**Step-by-Step Procedure**

To configure GTP services:

1. Configure the GTP services for the GGSN called MBG1.

```
[edit]
user@pe1# edit unified-edge gateways ggsn-pgw MBG1 gtp
```

2. Configure GTP services for the Gn, Gp, S5, and S8 interfaces with path management enabled. The same address must be specified for all addresses.

```
[edit unified-edge gateways ggsn-pgw MBG1 gtp]
user@pe1# set gn interface lo0.1
user@pe1# set gn interface v4-address 11.11.11.1
user@pe1# set gn n3-requests 3
user@pe1# set gn t3-response 3
user@pe1# set gn echo-interval 60
user@pe1# set gn path-management enable
user@pe1# set gp interface lo0.1
user@pe1# set gp interface v4-address 11.11.11.1
user@pe1# set gp n3-requests 3
user@pe1# set gp t3-response 3
user@pe1# set gp echo-interval 60
user@pe1# set gp path-management enable
user@pe1# set s5 interface lo0.1
user@pe1# set s5 interface v4-address 11.11.11.1
user@pe1# set s5 n3-requests 3
user@pe1# set s5 t3-response 3
user@pe1# set s5 echo-interval 60
user@pe1# set s5 path-management enable
user@pe1# set s8 interface lo0.1
user@pe1# set s8 interface v4-address 11.11.11.1
user@pe1# set s8 n3-requests 3
user@pe1# set s8 t3-response 3
```

```
user@pe1# set s8 echo-interval 60
user@pe1# set s8 path-management enable
```

## Configuring AAA

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge aaa mobile-profiles aaa_profile radius authentication network-element
  radius_ne
set unified-edge aaa mobile-profiles aaa_profile radius accounting network-element
  radius_ne
set unified-edge aaa mobile-profiles aaa_profile radius options nas-ip-address 11.11.11.1
set unified-edge aaa mobile-profiles aaa_profile radius attributes exclude calling-station-id
  access-request
set unified-edge aaa mobile-profiles aaa_profile radius attributes exclude event-time-stamp
  accounting-start
```

**Step-by-Step Procedure**

To configure AAA profiles:

1. Configure the AAA profile called aaa_profile for the broadband gateway.

   ```
   [edit]
   user@pe1# edit unified-edge aaa mobile-profiles aaa_profile
   ```

2. Specify the RADIUS authentication and accounting settings for the profile.

   ```
   [edit unified-edge aaa mobile-profiles aaa_profile]
   user@pe1# set radius authentication network-element radius_ne
   user@pe1# set radius accounting network-element radius_ne
   ```

3. Specify the RADIUS options.

   ```
   [edit unified-edge aaa mobile-profiles aaa_profile]
   user@pe1# set radius options nas-ip-address 11.11.11.1
   ```

4. Specify the RADIUS attributes to exclude from the message type.

   ```
   [edit unified-edge aaa mobile-profiles aaa_profile]
   user@pe1# set radius attributes exclude calling-station-id access-request
   user@pe1# set radius attributes exclude event-time-stamp accounting-start
   ```

## Configuring APN Parameters

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless1.juniper.net apn-type
  real
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless1.juniper.net
  apn-data-type ipv4
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless1.juniper.net
  mobile-interface mif.1
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless1.juniper.net
  address-assignment local
```

```
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless1.juniper.net
  address-assignment inet-pool pool wireless-juniper1
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless1.juniper.net
  session-timeout 2
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless1.juniper.net
  idle-timeout 60
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless1.juniper.net charging
  default-charging-profile chr-wireless1.juniper.net
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless1.juniper.net
  selection-mode from-ms
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless2.juniper.net apn-type
  real
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless2.juniper.net
  apn-data-type ipv4
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless2.juniper.net
  mobile-interface mif.2
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless2.juniper.net
  address-assignment local
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless2.juniper.net
  address-assignment inet-pool pool wireless-juniper1
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless2.juniper.net
  address-assignment dhcpv4-proxy-client-profile logical-system default routing-instance
  DHCP profile-name dhcp-1
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless2.juniper.net
  session-timeout 2
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless2.juniper.net
  idle-timeout 60
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless2.juniper.net
  aaa-profile aaa_profile
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless2.juniper.net charging
  default-charging-profile CGW-chr-pro-1
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless2.juniper.net
  selection-mode from-ms
```

**Step-by-Step Procedure**

To configure APN services:

1. Configure the APN services for the GGSN called MBG1.

   ```
   [edit]
   user@pe1# edit unified-edge gateways ggsn-pgw MBG1 apn-services
   ```

2. Configure the wireless1.juniper.net APN used for the mif.1 interface. This APN uses the wireless-juniper1 IP pool for address assignment and chr-wireless1.juniper.net as the default charging profile.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 apn-services]
   user@pe1# set apn wireless1.juniper.net apn-type real
   user@pe1# set apn wireless1.juniper.net apn-data-type ipv4
   user@pe1# set apn wireless1.juniper.net mobile-interface mif.1
   user@pe1# set apn wireless1.juniper.net address-assignment local
   user@pe1# set apn wireless1.juniper.net address-assignment inet-pool pool
     wireless-juniper1
   user@pe1# set apn wireless1.juniper.net session-timeout 2
   user@pe1# set apn wireless1.juniper.net idle-timeout 60
   user@pe1# set apn wireless1.juniper.net charging default-charging-profile
     chr-wireless1.juniper.net
   ```

```
user@pe1# set apn wireless1.juniper.net selection-mode from-ms
```

3. Configure the wireless2.juniper.net APN used for the mif.2 interface. This APN uses the wireless-juniper1 IP pool or dhcpv4-proxy-client-profile for address assignment. This APN uses aaa_profile as the AAA profile and CGW-chr-pro-1 as the default charging profile.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services]
user@pe1# set apn wireless2.juniper.net apn-type real
user@pe1# set apn wireless2.juniper.net apn-data-type ipv4
user@pe1# set apn wireless2.juniper.net mobile-interface mif.2
user@pe1# set apn wireless2.juniper.net address-assignment local
user@pe1# set apn wireless2.juniper.net address-assignment inet-pool pool
  wireless-juniper1
user@pe1# set apn wireless2.juniper.net address-assignment
  dhcpv4-proxy-client-profile logical-system default routing-instance DHCP
  profile-name
user@pe1# set apn wireless2.juniper.net session-timeout 2
user@pe1# set apn wireless2.juniper.net idle-timeout 60
user@pe1# set apn wireless2.juniper.net aaa-profile aaa_profile
user@pe1# set apn wireless2.juniper.net charging default-charging-profile
  CGW-chr-pro-1
user@pe1# set apn wireless2.juniper.net selection-mode from-ms
```

## Verification

### Verifying MPLS LSP Status

**Purpose** Verify the MPLS LSP status for GGSN initiation.

**Action**

```
user@pe1> show mpls lsp
Ingress LSP: 1 sessions
To              From            State Rt P     ActivePath       LSPname
10.255.28.17    10.102.32.59    Up     0 *                      PE-1-to-PE-2
Total 1 displayed, Up 1, Down 0

Egress LSP: 1 sessions
To              From            State   Rt Style Labelin Labelout LSPname
10.102.32.59    10.255.28.17    Up       0  1 FF       0        - PE-2-to-PE-1
Total 1 displayed, Up 1, Down 0

Transit LSP: 0 sessions
Total 0 displayed, Up 0, Down 0
```

**Meaning** The **show mpls lsp** command displays information about the configured label-switched paths, including the destination address.

### Verifying Layer 3 VPN Status

**Purpose** Verify Layer 3 VPN status and routes for GGSN initiation and successful call establishment.

**Action**

```
user@pe1> show route table VRF-wireless1.juniper.net
VRF-wireless1.juniper.net.inet.0: 14 destinations, 14 routes (14 active, 0
holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both
```

```
11.11.11.1/32      *[Direct/0] 01:08:14
                    > via lo0.10
55.55.0.0/16       *[BGP/170] 00:15:55, localpref 100, from 10.255.28.17
                      AS path: I
                   > to 33.55.0.2 via ge-5/3/0.0, label-switched-path PE-1-to-PE-2
100.104.172.0/22   *[Anchor/7] 00:04:53
                      Private indexed

100.104.176.0/22   *[Anchor/7] 00:04:52
                      Private indexed
100.104.180.0/22   *[Anchor/7] 00:04:51
                      Private indexed
100.105.20.0/22    *[Anchor/7] 00:04:53
                      Private indexed
100.105.24.0/22    *[Anchor/7] 00:04:52
                      Private indexed
100.105.28.0/22    *[Anchor/7] 00:04:51
                      Private indexed
100.105.32.0/22    *[Anchor/7] 00:04:50
                      Private indexed
100.105.36.0/22    *[Anchor/7] 00:04:50
                      Private indexed
run show unified-edge ggsn-pgw resource-manager clients | no-more
100.105.40.0/22    *[Anchor/7] 00:04:49
                      Private indexed
100.105.136.0/22   *[Anchor/7] 00:04:50
                      Private indexed
100.105.140.0/22   *[Anchor/7] 00:04:50
                      Private indexed
100.105.144.0/22   *[Anchor/7] 00:04:49
                      Private indexed
```

**Meaning** The **show route table** command verifies the Layer 3 VPN configuration by displaying the VRF table for the specified VRF.

### Verifying Session DPCs and Interface DPCs Initialization

**Purpose** Verify the initialization of session DPCs and interface DPCs for GGSN initiation.

**Action**

```
user@pe1> show chassis fpc pic-status
Slot 0   Online       MPC Type 2 3D EQ
  PIC 0  Online       10x 1GE(LAN) SFP
  PIC 1  Online       10x 1GE(LAN) SFP
  PIC 2  Online       10x 1GE(LAN) SFP
  PIC 3  Online       10x 1GE(LAN) SFP
Slot 1   Online       MS-DPC EM
  PIC 0  Online       MS-DPC PIC
  PIC 1  Online       MS-DPC PIC
Slot 2   Online       MPC Type 2 3D EQ
  PIC 0  Online       10x 1GE(LAN) SFP
  PIC 1  Online       10x 1GE(LAN) SFP
  PIC 2  Online       10x 1GE(LAN) SFP
  PIC 3  Online       10x 1GE(LAN) SFP
Slot 3   Online       MS-DPC EM
  PIC 0  Online       MS-DPC PIC
  PIC 1  Online       MS-DPC PIC
Slot 4   Online       MPC Type 2 3D EQ
  PIC 0  Online       2x 10GE  XFP
```

```
  PIC 1  Online       2x 10GE  XFP
  PIC 2  Online       10x 1GE(LAN) SFP
  PIC 3  Online       10x 1GE(LAN) SFP
Slot 5   Online       MPC Type 2 3D EQ
  PIC 0  Online       10x 1GE(LAN) SFP
  PIC 1  Online       10x 1GE(LAN) SFP
  PIC 2  Online       10x 1GE(LAN) SFP
  PIC 3  Online       10x 1GE(LAN) SFP
```

```
user@pe1> show unified-edge ggsn-pgw resource-manager clients
Client      State           Role                Type
apfe-0/1    In-Service     RMS_PRIMARY         RCM-PFE
apfe-0/0    In-Service     RMS_PRIMARY         RCM-PFE
ms-1/0      In-Service     RMS_PRIMARY         RCM-SP
ms-1/1      In-Service     RMS_PRIMARY         RCM-SP
apfe-2/1    In-Service     RMS_SECONDARY       RCM-PFE
apfe-2/0    In-Service     RMS_SECONDARY       RCM-PFE
ms-3/0      In-Service     RMS_SECONDARY       RCM-SP
ms-3/1      In-Service     RMS_SECONDARY       RCM-SP
apfe-4/1    In-Service     RMS_PRIMARY         RCM-PFE
apfe-4/0    In-Service     RMS_PRIMARY         RCM-PFE
apfe-5/1    In-Service     RMS_SECONDARY       RCM-PFE
apfe-5/0    In-Service     RMS_SECONDARY       RCM-PFE
```

**Meaning** The **show chassis fpc pic-status** command lists the PIC status. It shows that the DPCs are initialized if the status is Online.

The **show unified-edge ggsn-pgw resource-manager clients** command lists the state for resource manager clients. It displays the In-Service state to indicate that the DPCs are initialized.

### Verifying Broadband Gateway Status

**Purpose** Verify the status and statistics on the broadband gateway for GGSN initiation, call establishment, and Gn-to-Gi connectivity across the MPLS core.

**Action**

```
user@pe1> show unified-edge ggsn-pgw status
    Mobile gateway status:
    Active Subscribers   :              180
    Active Sessions      :              180
    Active Bearers       :              180
    CPU Load (%)         :              0
    Memory Load (%)      :              27
```

```
user@pe1> show unified-edge ggsn-pgw statistics
Control plane statistics:
    Session establishment attempts:             200180
    Successful session establishments:          200180
    MS/peer initiated session deactivations:    199611
    Successful MS/peer initiated deactivations: 199611
    Gateway initiated session deactivations:    389
    Successful gateway initiated deactivations: 389
Data plane GTP statistics (Gn/S5/S8):
    Input     packets:          88696
    Input     bytes:            7805248
    Output    packets:          87843
    Output    bytes:            7730184
    Discarded packets:          0
```

```
Data plane GTP statistics (Gi):
    Input     packets:          87843
    Input     bytes:            7730184
    Output    packets:          88696
    Output    bytes:            7805248
    Discarded packets:          0
```

**Meaning** The **show unified-edge ggsn-pgw status** command displays the status of the broadband gateway, including the number of active subscribers, active sessions, and active bearers. It also displays the CPU load and memory load.

The **show unified-edge ggsn-pgw statistics** command displays the control plane and data plane statistics for the broadband gateway.

### Verifying Session Establishment

**Purpose** Verify the session establishment for call establishment and Gn-to-Gi connectivity across the MPLS core.

**Action**

```
user@pe1> show unified-edge ggsn-pgw subscribers
    IMSI             MSISDN          Subscriber          Peer           APN
                                      Address           Address
 333444444444535        34444535  100.105.24.1      22.0.111.111
wireless1.juniper.net
 666444444494456        64494456  100.105.36.3      88.2.111.111
wireless1.juniper.net
 999114444444489        91444489  100.105.28.14     99.0.111.111
wireless1.juniper.net
 888455444444518        84554518  100.105.28.5      55.0.111.111
wireless1.juniper.net
 222444444444552      2224444552  100.105.24.19     22.2.222.223
wireless1.juniper.net

user@pe1> show unified-edge ggsn-pgw subscribers extensive
Subscriber Information:
    IMSI: 333444444444535    IMEI: 1122334455667874
    MSISDN: 34444535         Time Zone: None    (DST): None
    Status: Home
User Location Info:
      MCC:  None  MNC:  None
      LAC: 0x0  CI: 0x0     SAC: 0x0  RAC: 0x0  TAC: 0x0  ECI: 0x0
    RAT Type: Unknown
  PDN Session:
    APN name: wireless1.juniper.net
    IPv4 Address: 100.105.24.1      IPv6 Address: None
    Direct Tunnel: Disabled         Session Duration: 4:52
    Local Control address: 11.11.11.1 Remote Control address: 22.0.111.111
    TEID Control Local: 0xa01944a   TEID Control Remote: 0x1b28a
    Addressing scheme: Local        Selection mode: sub verified
    Session PIC: 1 /0  (FPC/PIC)    Anchor PFE: 0 /0  (FPC/PIC)
    Session State: Established      GTP Version: 1
    Serving network: MCC: None MNC :None
  Bearer:
    NSAPI/EBI: 5                     Charging ID: 0xa01944a
    Local Data address: 11.11.11.1   Remote Data address: 22.0.111.111
    Local TEID: 0x420400             Remote TEID: 0x1b289
    Bearer State: Established        Substate: -
    Idle Timeout: 60  min(188-0,0)   AAA Interim Interval: 0  min(0 -0,0)
```

```
Negotiated QoS Parameters:
 Traffic Class:Background        ARP: 1
 Traffic Handling Priority:3     Transfer Delay      :10
 MBR Uplink: 8640       kbps     MBR Downlink        :8640      kbps
                                 Signaling Indicator :0
 Forwarding Class:  -              Loss Priority:  -
Requested QoS Parameters:
 Traffic Class: Background         ARP: 1
 Traffic Handling Priority: 3      Transfer Delay: 10
 MBR Uplink  : 8640       kbps     MBR Downlink: 8640      kbps
                                   Signaling Indicator: 0
Charging information:
 Profile ID: 1 Profile name: chr-wireless1.juniper.net
 State: Ready        Previous State: Ga
 Profile selection criteria: Static default
 Details: Accounting enabled, Offline bearer
Offline charging information:
 Current service data container sequence number: 0
 Current partial record sequence number        : 0
 Number of CDRs closed                         : 0
Rating group information:
  Rating group: 0 Service id: 0
  Action ID: 0x101944a          Trigger profile: 2
  Change condition bitmask: 0x0 Action-id-bitmask: 0x1
  Signal bitmask: 0x0           Last signal bitmask: 0x0
  Details: Bearer trigger, Offline RG
  Last statistics collection time : None collected

.
.
.
```

**Meaning** The **show unified-edge ggsn-pgw subscribers** command lists the established sessions.

The **show unified-edge ggsn-pgw subscribers extensive** command displays detailed information about these subscribers.

### Verifying GTP-C Status

**Purpose** Verify the GTP-C status for call establishment.

**Action**

```
user@pe1> show unified-edge ggsn-pgw gtp peer
Rmt IP Address           Local IP Address         Routing-Instance
-----------------------------------------------------------------
88.5.100.100                11.11.11.1                  10
88.0.100.100                11.11.11.1                  8
88.0.100.104                11.11.11.1                  8
88.0.111.111                11.11.11.1                  8

user@pe1> show unified-edge ggsn-pgw gtp peer remote-address 88.0.111.111 detail
Peer Detail:
---------------
Remote IP Addr                      = 88.0.111.111
Local IP Addr                       = 11.11.11.1
Routing Instance                    = 8
Interface Type                      = GTP_INTF_GN
GTP Version                         = 1
RCM Registration Done               = yes
Is Restart Counter Valid            = yes
```

```
Restart Counter Value                = 1
Sent Restart Counter Value           = 7
Control Path N3 Req                  = 3
Control Path T3 Timer                = 5
Control Path Echo N3 Req             = 8
Control Path Echo T3 Timer           = 15
Control Path Echo Interval           = 60
Is PATH Management Enabled (control) = no
Is CSID Supported                    = no
IS GTP-C using Short Seq Number      = no
GTP-C Path State                     = inactive
Data Path N3 Req                     = 8
Data Path T3 Timer                   = 15
Data Path Echo Interval              = 60
Is PATH Management Enabled (Data)    = no
GTP-U Path State                     = inactive

user@pe1> show unified-edge ggsn-pgw gtp statistics
Global Packet Statistics
  Received Packets Dropped           : 0
  Packet Allocation Fail             : 0
  Packet Send Fail                   : 0
  IP Version Error Received          : 0
  IP Protocol Error Received         : 0
  GTP Port Error Received            : 0
  Packet Length Error Received       : 0
  Unknown Messages Received          : 0

GTP Version 0 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 0
  T3 Response Timer Expires          : 0


  Message Type                                        Received        Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                            63              63
  Total number of bytes                               4158            4032
  Redirect messages                                   0               0
  Echo Request                                        0               0
  Echo Response                                       0               0
  Version Not Supported                               0               0
  Create PDP Context Request                          63              0
  Create PDP Context Response                         0               63
  Update PDP Context Request                          0               0
  Update PDP Context Response                         0               0
  Delete PDP Context Request                          0               0
  Delete PDP Context Response                         0               0

GTP Version 1 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 0
  T3 Response Timer Expires          : 0


  Message Type                                        Received        Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                            216464          217110
  Total number of bytes                               13611840        9676412
```

```
  Redirect messages                                0              0
  Echo Request                                     0              0
  Echo Response                                    0              0
  Version Not Supported                            0              620
  Create PDP Context Request                       116474         0
  Create PDP Context Response                      0              116474
  Update PDP Context Request                       0              0
  Update PDP Context Response                      0              0
  Delete PDP Context Request                       99990          23
  Delete PDP Context Response                      0              99990

GTP Version 2 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 0
  T3 Response Timer Expires          : 0


  Message Type                                     Received       Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                         219727         219473
  Total number of bytes                            24348253       12581846
  Redirect messages                                0              0
  Echo Request                                     0              0
  Echo Response                                    0              0
  Version Not Supported                            0              0
  Create session request                           120080         0
  Create session response                          0              119460
  Modify bearer request                            0              0
  Modify bearer response                           0              0
  Delete session request                           99647          0
  Delete session response                          0              99647
  Create bearer request                            0              0
  Create bearer response                           0              0
  Update bearer request                            0              0
  Update bearer response                           0              0
  Delete bearer request                            0              366
  Delete bearer response                           0              0
  Delete PDN connection set request                0              0
  Delete PDN connection set response               0              0
  Update PDN connection set request                0              0
  Update PDN connection set response               0              0
  Modify bearer command                            0              0
  Modify bearer failure indication                 0              0
  Delete bearer command                            0              0
  Delete bearer failure indication                 0              0
  Bearer resource command                          0              0
  Bearer resource failure indication               0              0
  Change notification request                      0              0
  Change notification response                     0              0


Error Indication Statistics:
  Version                                          Received       Transmitted
  ------------------------------------------------------------------------------
  GTPv0                                            0              0
  GTPv1                                            0              3
```

**Meaning** The **show unified-edge ggsn-pgw gtp peer** command displays the GTP peers.

The **show unified-edge ggsn-pgw gtp peer remote-address *address* detail** command displays detailed information about the specified GTP peer.

The **show unified-edge ggsn-pgw gtp statistics** command displays the GTP statistics.

## Verifying Charging Status

**Purpose** Verify the charging status for call establishment.

**Action**

```
user@pe1> show unified-edge ggsn-pgw charging transfer status
Charging Transfer Status
Transport-Profile : CGW-TRANS-pro-1
  Total UnAck CDR's         : 19995
  Total Buffered CDR's      : 280005

Transport-Profile : trans-wireless1.juniper.net
  Total UnAck CDR's         : 0
  Total Buffered CDR's      : 50000

user@pe1> show unified-edge ggsn-pgw charging transfer statistics
Charging Transfer Statistics
Transport-Profile : CGW-TRANS-pro-1
  Redirection Requests     Rx: 0     Redirection Responses    Tx: 0
  DRT Responses            Rx: 0     DRT Requests             Tx: 4000
  DRT successful Responses Rx: 0     DRT Error Responses      Rx: 0
  DRT Requests timed out     : 334525 CGF Switch Back Times      : 64
  Batch Requests           Tx: 0     Batch Response Errors    Rx: 0
  Batch CDR's              Tx: 0     CDR Count                  : 19995
  Total WFA                  : 4000

Transport-Profile : trans-wireless1.juniper.net
  Redirection Requests     Rx: 0     Redirection Responses    Tx: 0
  DRT Responses            Rx: 0     DRT Requests             Tx: 0
  DRT successful Responses Rx: 0     DRT Error Responses      Rx: 0
  DRT Requests timed out     : 0     CGF Switch Back Times      : 0
  Batch Requests           Tx: 1362  Batch Response Errors    Rx: 0
  Batch CDR's              Tx: 50000 CDR Count                  : 50000
  Total WFA                  : 0

user@pe1> show unified-edge ggsn-pgw charging local-persistent-storage statistics
Charging local-persistent-storage Statistics
  Batch Messages received                            : 1362
  Batch Responses sent                               : 1362
  Invalid Messages received                          : 0
  Number of temp log files opened                    : 1
  Number of journal files opened                     : 1
  Number of journal files closed                     : 0
  Number of CDR log files closed                     : 0
  Number of CDR files closed due to file-age         : 0
  Number of CDR files closed due to file-size        : 0
  Number of CDR files closed due to cdr-count        : 0
  Abnormal file closures                             : 0
  Normal file closures                               : 0
  Number of CDR log files closed in TS_32_297 format  : 0
  Number of CDR log files closed in raw asn1 format   : 0
  Total number of CDRs backed up                     : 50000
  Disk Full messages sent                            : 0
  Disk Full resolve messages sent                    : 0
  Number of async IO reqs written                    : 1362
```

```
  Number of CDR storage files on disk                : 3
  Disk space status                                  : DISK_AVAILABLE
  Current storage space in use(MB)                   : 6685
  Available storage space on disk(MB)                : 27862
  Total storage space on disk(MB)                    : 34547
  Watermark level1 at(MB)                            : 24182(70%)
  Watermark level2 at(MB)                            : 27637(80%)
  Watermark level3 at(MB)                            : 31092(90%)

Temporary CDR log file Statistics
File Name: /var/db/mobility/charging/ggsn/temp_log/templog_file_1.log
    Journal file name          : /var/db/mobility/charging/ggsn/jrnl/jrnl_1.log
    Current number of CDRs     : 50000
    Current file size(bytes)   : 10357039
    File age trigger(mins)     : 60
    File size trigger(bytes)   : 10485760
    CDR count trigger          : 0
```

**Meaning** The **show unified-edge ggsn-pgw charging transfer status** command displays the charging transfer status. It also displays information about the CDR transfers for the transport profiles.

The **show unified-edge ggsn-pgw charging transfer statistics** command displays the charging transfer statistics for the transport profiles.

The **show unified-edge ggsn-pgw charging local-persistent-storage statistics** command displays the charging statistics for local persistent storage.

### Verifying Mobile Interfaces

**Purpose** Verify there is no data loss across the mobile interfaces for call establishment and Gn-to-Gi connectivity across the MPLS core.

**Action**

```
user@pe1> show interfaces mif.1 extensive
  Logical interface mif.1 (Index 85) (SNMP ifIndex 812) (Generation 165)
    Flags: SNMP-Traps Encapsulation: GTP-over-MIF
    Bandwidth: 1000mbps
    Traffic statistics:
     Input  bytes  :              6160000
     Output bytes  :              6084936
     Input  packets:                70000
     Output packets:                69147
    Local statistics:
     Input  bytes  :                    0
     Output bytes  :                    0
     Input  packets:                    0
     Output packets:                    0
    Transit statistics:
     Input  bytes  :              6160000                    0 bps
     Output bytes  :              6084936                    0 bps
     Input  packets:                70000                    0 pps
     Output packets:                69147                    0 pps
    Protocol inet, MTU: 1440, Generation: 219, Route table: 12
      Flags: Sendbcast-pkt-to-re, Is-Primary

user@pe1> show interfaces mif.2 extensive
```

```
Logical interface mif.2 (Index 86) (SNMP ifIndex 813) (Generation 166)
  Flags: SNMP-Traps Encapsulation: GTP-over-MIF
  Bandwidth: 1000mbps
  Traffic statistics:
   Input  bytes  :                   0
   Output bytes  :                   0
   Input  packets:                   0
   Output packets:                   0
  Local statistics:
   Input  bytes  :                   0
   Output bytes  :                   0
   Input  packets:                   0
   Output packets:                   0
  Transit statistics:
   Input  bytes  :                   0                    0 bps
   Output bytes  :                   0                    0 bps
   Input  packets:                   0                    0 pps
   Output packets:                   0                    0 pps
  Protocol inet, MTU: 1440, Generation: 220, Route table: 13
    Flags: Sendbcast-pkt-to-re
```

**Meaning** The **show interfaces mif.*number* extensive** command displays detailed information about the specified mobile interface.

## Example: Configuring MobileNext Broadband Gateway with Provider Edge Functionality

This example describes how to configure the MobileNext Broadband Gateway integrated with provider edge functionality.



### Requirements

This example uses the following hardware and software components:

- Junos OS Release 11.2W
- Juniper Networks MobileNext Broadband Gateway

Before you configure the broadband gateway, make sure you have the following information:

- IP addresses for configuring GPRS tunneling protocol (GTP), RADIUS, and charging signaling functions.
- MPLS provider-edge configuration details for MX 3D Universal Edge Routers, including BGP peer configuration, IP addresses, AS number, import/export route target, and IGP configuration.

## Overview

This example describes how to configure the broadband gateway integrated with provider edge functionality. VPN routing and forwarding (VRF) is used to support the following configuration:

- Internal BGP is used to exchange VPN routing information between the provider edge routers.
- RSVP is used in the MPLS backbone to establish the label-switched paths (LSPs) between the provider edge routers.

NOTE: **All routing instances are VRF routing instances in the MPLS VPN.**

- 3GPP interfaces (Gn and S5) for control are in the same VRF called VRF11-Control.
- 3GPP interfaces (Gn and S5) for data are in the same VRF called VRF11-Data.
- 3GPP interfaces (Gp and S8) for control are in the same VRF called VRF12-Control.
- 3GPP interfaces (Gp and S8) for data are in the same VRF called VRF12-Data.
- Gi interfaces (Gi, SGi) to the external networks are in the same VRF named VRF3.
- RADIUS server and charging are in the VRF called VRF2.

### Table 54: Components of the Broadband Gateway

| Property | Settings | Description |
|---|---|---|
| Loopback address | lo0 unit 100 address 192.168.100.1/32<br>lo0 unit 111 address 192.168.111.1/32<br>lo0 unit 112 address 192.168.112.1/32<br>lo0 unit 121 address 192.168.121.1/32<br>lo0 unit 122 address 192.168.122.1/32<br>lo0 unit 200 address 192.168.200.1/32 | Interfaces used for 3GPP signaling and IP routing functions |
| Routing protocol | bgp | Indicates device is using BGP as routing protocol |
| MPLS protocol and LSP definition | mpls | Indicates device is using the MPLS protocol |
| RSVP | rsvp | Indicates device is using RSVP |
| Gi/SGi routing instance | VRF3<br>mif.0 | Mobile interface unit 0 (mif unit 0) is associated with Gi/SGi routing instance by placing the interface in VRF3 |
| Gn/S5 control connectivity | VRF11-Control<br>lo0.111 | VRF for Gn/S5 interfaces for control |

Table 54: Components of the Broadband Gateway *(continued)*

| Property | Settings | Description |
|---|---|---|
| Gn/S5 data connectivity | VRF11-Data<br>lo0.112 | VRF for Gn/S5 interfaces for data |
| Gp/S8 control connectivity | VRF12-Control<br>lo0.121 | VRF for Gp/S8 interfaces for control |
| Gp/S8 data connectivity | VRF12-Data<br>lo0.122 | VRF for Gp/S8 interfaces for data |
| RADIUS/charging connectivity | VRF2<br>lo0.200 | VRF for charging and RADIUS servers |

## Configuration



### Configuring the Chassis

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
load merge /etc/config/mobility-defaults.conf
set chassis fpc 1 pic 0 apply-groups mobility
set chassis fpc 1 pic 1 apply-groups mobility
set chassis fpc 3 pic 0 apply-groups mobility
set chassis fpc 3 pic 1 apply-groups mobility
set chassis fpc 0 forwarding-packages mobility ggsn-pgw
set chassis fpc 5 forwarding-packages mobility ggsn-pgw
set interfaces lo0 unit 100 family inet address 192.168.100.1/32
set interfaces lo0 unit 111 family inet address 192.168.111.1/32
set interfaces lo0 unit 112 family inet address 192.168.112.1/32
set interfaces lo0 unit 121 family inet address 192.168.121.1/32
set interfaces lo0 unit 122 family inet address 192.168.122.1/32
set interfaces lo0 unit 200 family inet address 192.168.200.1/32
set chassis fpc 5 pic 2 tunnel-services bandwidth 10g
set interfaces vt-5/2/0 unit 0 family inet
```

**Step-by-Step Procedure**

To configure the chassis:

1. Load and merge the default configuration file for the **mobility** group.

```
[edit]
user@pe1# load merge /etc/config/mobility-defaults.conf
```

2. Configure the **mobility** group on the session DPCs.

```
[edit]
user@pe1# set chassis fpc 1 pic 0 apply-groups mobility
user@pe1# set chassis fpc 1 pic 1 apply-groups mobility
user@pe1# set chassis fpc 3 pic 0 apply-groups mobility
user@pe1# set chassis fpc 3 pic 1 apply-groups mobility
```

NOTE: You must include every services PIC configured with the **jservices-mobile** package at the **[edit unified-edge gateways ggsn-pgw *gateway-name* system anchor-spics]** hierarchy level on the broadband gateway. If you do not include the services PIC as an anchor interface, then the services PIC will not be used by the broadband gateway.

3. Configure the interface MPC at the FPC level.

```
[edit]
user@pe1# set chassis fpc 0 forwarding-packages mobility ggsn-pgw
user@pe1# set chassis fpc 5 forwarding-packages mobility ggsn-pgw
```

NOTE: You must include every Packet Forwarding Engine configured with the **ggsn-pgw** forwarding package at the **[edit unified-edge gateways ggsn-pgw *gateway-name* system anchor-pfes]** hierarchy level on the broadband gateway. If you do not specify the Packet Forwarding Engine as an anchor interface, then the Packet Forwarding Engine will not be used by the broadband gateway.

4. Configure loopback interfaces for signaling functions.

```
[edit]
user@pe1# set interfaces lo0 unit 100 family inet address 192.168.100.1/32
user@pe1# set interfaces lo0 unit 111 family inet address 192.168.111.1/32
user@pe1# set interfaces lo0 unit 112 family inet address 192.168.112.1/32
user@pe1# set interfaces lo0 unit 121 family inet address 192.168.121.1/32
user@pe1# set interfaces lo0 unit 122 family inet address 192.168.122.1/32
user@pe1# set interfaces lo0 unit 200 family inet address 192.168.200.1/32
```

5. Configure the tunnel interfaces.

```
[edit]
user@pe1# set chassis fpc 5 pic 2 tunnel-services bandwidth 10g
user@pe1# set interfaces vt-5/2/0 unit 0 family inet
```

### Configuring the MPLS/BGP VPN

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set protocols mpls label-switched-path LSP1 to 192.168.100.5
set protocols mpls label-switched-path LSP1 no-cspf
set protocols mpls interface xe-1/0/1
set protocols rsvp interface xe-1/0/1
set protocols bgp local-as 14203
set protocols bgp group PE1-PE2 type internal
set protocols bgp group PE1-PE2 local-address 192.168.100.1
set protocols bgp group PE1-PE2 family inet-vpn unicast
set protocols bgp group PE1-PE2 neighbor 192.168.100.5
```

**Step-by-Step Procedure**

To enable MPLS and RSVP:

1. In the MPLS configuration, specify the LSP used for dynamic MPLS and disable constrained-path LSP computation.

   ```
   [edit]
   user@pe1# set protocols mpls label-switched-path LSP1 to 192.168.100.5
   user@pe1# set protocols mpls label-switched-path LSP1 no-cspf
   ```

2. Include the interface in the MPLS and RSVP protocol configuration.

   ```
   [edit]
   user@pe1# set protocols rsvp interface xe-1/0/1
   user@pe1# set protocols mpls interface xe-1/0/1
   ```

3. Configure the local AS for BGP updates.

   ```
   [edit]
   user@pe1# set protocols bgp local-as 14203
   ```

4. Configure the BGP group for Layer 3 VPNs.

   ```
   [edit]
   user@pe1# set protocols bgp group PE1-PE2 type internal
   user@pe1# set protocols bgp group PE1-PE2 local-address 192.168.100.1
   user@pe1# set protocols bgp group PE1-PE2 family inet-vpn unicast
   user@pe1# set protocols bgp group PE1-PE2 neighbor 192.168.100.5
   ```

### Enabling the Routing Instances for the VPN

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set routing-instances VRF11-Control instance-type vrf
set routing-instances VRF11-Control interface lo0.111
set routing-instances VRF11-Control route-distinguisher 192.168.100.1:111
set routing-instances VRF11-Control vrf-target target:1:111
set routing-instances VRF11-Control vrf-table-label
set routing-instances VRF11-Data instance-type vrf
set routing-instances VRF11-Data interface lo0.112
```

```
set routing-instances VRF11-Data route-distinguisher 192.168.100.1:112
set routing-instances VRF11-Data vrf-target target:1:112
set routing-instances VRF11-Data vrf-table-label
set routing-instances VRF12-Control instance-type vrf
set routing-instances VRF12-Control interface lo0.121
set routing-instances VRF12-Control route-distinguisher 192.168.100.1:121
set routing-instances VRF12-Control vrf-target target:1:121
set routing-instances VRF12-Control vrf-table-label
set routing-instances VRF12-Data instance-type vrf
set routing-instances VRF12-Data interface lo0.122
set routing-instances VRF12-Data route-distinguisher 192.168.100.1:122
set routing-instances VRF12-Data vrf-target target:1:122
set routing-instances VRF12-Data vrf-table-label
set routing-instances VRF2 instance-type vrf
set routing-instances VRF2 interface lo0.200
set routing-instances VRF2 route-distinguisher 192.168.100.1:200
set routing-instances VRF2 vrf-target target:1:200
set routing-instances VRF2 interface vt-5/2/0.0
```

**Step-by-Step Procedure**

To configure the routing instance for the VRF used in the Layer 3 VPN:

BEST PRACTICE: For GTP traffic, use the vrf-table-label option when configuring the routing instances. For RADIUS or charging traffic, use the tunnel interface when configuring the routing instance.

1. Configure the VRF routing instances for GTP traffic.

```
[edit]
user@pe1# set routing-instances VRF11-Control instance-type vrf
user@pe1# set routing-instances VRF11-Control interface lo0.111
user@pe1# set routing-instances VRF11-Control route-distinguisher 192.168.100.1:111
user@pe1# set routing-instances VRF11-Control vrf-target target:1:111
user@pe1# set routing-instances VRF11-Control vrf-table-label
user@pe1# set routing-instances VRF11-Data instance-type vrf
user@pe1# set routing-instances VRF11-Data interface lo0.112
user@pe1# set routing-instances VRF11-Data route-distinguisher 192.168.100.1:112
user@pe1# set routing-instances VRF11-Data vrf-target target:1:112
user@pe1# set routing-instances VRF11-Data vrf-table-label
user@pe1# set routing-instances VRF12-Control instance-type vrf
user@pe1# set routing-instances VRF12-Control interface lo0.121
user@pe1# set routing-instances VRF12-Control route-distinguisher 192.168.100.1:121
user@pe1# set routing-instances VRF12-Control vrf-target target:1:121
user@pe1# set routing-instances VRF12-Control vrf-table-label
user@pe1# set routing-instances VRF12-Data instance-type vrf
user@pe1# set routing-instances VRF12-Data interface lo0.122
user@pe1# set routing-instances VRF12-Data route-distinguisher 192.168.100.1:122
user@pe1# set routing-instances VRF12-Data vrf-target target:1:122
user@pe1# set routing-instances VRF12-Data vrf-table-label
```

2. Configure the VRF routing instance for RADIUS or charging traffic.

```
[edit]
user@pe1# set routing-instances VRF2 instance-type vrf
```

```
user@pe1# set routing-instances VRF2 interface lo0.200
user@pe1# set routing-instances VRF2 route-distinguisher 192.168.100.1:200
user@pe1# set routing-instances VRF2 vrf-target target:1:200
user@pe1# set routing-instances VRF2 interface vt-5/2/0.0
```

### Configuring GTP Interfaces

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways ggsn-pgw MBG1 gtp gn control interface lo0.111
set unified-edge gateways ggsn-pgw MBG1 gtp gn data interface lo0.112
set unified-edge gateways ggsn-pgw MBG1 gtp gp control interface lo0.121
set unified-edge gateways ggsn-pgw MBG1 gtp gp data interface lo0.122
set unified-edge gateways ggsn-pgw MBG1 gtp s5 control interface lo0.111
set unified-edge gateways ggsn-pgw MBG1 gtp s5 data interface lo0.112
set unified-edge gateways ggsn-pgw MBG1 gtp s8 control interface lo0.121
set unified-edge gateways ggsn-pgw MBG1 gtp s8 data interface lo0.122
```

**Step-by-Step Procedure**

To configure GTP interfaces:

1. Configure the GTP interfaces for the broadband gateway called MBG1.

   ```
   [edit]
   user@pe1# edit unified-edge gateways ggsn-pgw MBG1 gtp
   ```

2. Specify the appropriate loopback interface associated with the VRF routing instance for the Gn, Gp, S5, and S8 interfaces.

   ```
   [edit unified-edge gateways ggsn-pgw MBG1 gtp]
   user@pe1# set gn control interface lo0.111
   user@pe1# set gn data interface lo0.112
   user@pe1# set gp control interface lo0.121
   user@pe1# set gp data interface lo0.122
   user@pe1# set s5 control interface lo0.111
   user@pe1# set s5 data interface lo0.112
   user@pe1# set s8 control interface lo0.121
   user@pe1# set s8 data interface lo0.122
   ```

### Configuring the Source Interface for RADIUS and Charging Servers

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set access radius servers radius_server source-interface lo0.200
set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer CGF source-interface
  lo0.200
```

**Step-by-Step Procedure**

To associate source interfaces with the RADIUS or charging servers:

1. Specify the source interface for the RADIUS server.

   ```
   [edit]
   user@pe1# set access radius servers radius_server source-interface lo0.200
   ```

2. Specify the source interface for the charging server.

```
[edit]
user@pe1# set unified-edge gateways ggsn-pgw MBG1 charging gtpp peer CGF
  source-interface lo0.200
```

### Enabling the APN Configuration

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set interfaces mif unit 0 family inet
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless.juniper.net
  apn-data-type ipv4
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless.juniper.net
  mobile-interface mif.0
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless.juniper.net
  address-assignment local
set unified-edge gateways ggsn-pgw MBG1 apn-services apns wireless.juniper.net
  aaa-profile aaa_profile
set routing-instances VRF3 interface mif unit 0 family inet
```

**Step-by-Step Procedure**

To enable the APN configuration:

1. Create the mobile interface for mobile subscribers.

```
[edit]
user@pe1# set interfaces mif unit 0 family inet
```

2. Configure the APN services for mobile subscribers on the broadband gateway called MBG1.

```
[edit]
user@pe1# edit unified-edge gateways ggsn-pgw MBG1 apn-services
```

3. Configure the wireless.juniper.net APN used for the mif.0 interface. This APN uses aaa_profile as the AAA profile.

```
[edit unified-edge gateways ggsn-pgw MBG1 apn-services]
user@pe1# set apns wireless.juniper.net apn-data-type ipv4
user@pe1# set apns wireless.juniper.net mobile-interface mif.0
user@pe1# set apns wireless.juniper.net address-assignment local
user@pe1# set apns wireless.juniper.net aaa-profile aaa_profile
```

4. Specify the VRF routing instance for routing mobile subscriber traffic on the mobile interface.

```
[edit]
user@pe1# set routing-instances VRF3 interface mif unit 0 family inet
```

## Verification

### Verifying MPLS LSP Status

**Purpose**

Verify the MPLS LSP status for broadband gateway initiation.

**Action**

```
user@pe1> show mpls lsp
Ingress LSP: 1 sessions
To              From            State Rt P     ActivePath       LSPname
192.168.100.5   10.102.32.59    Up     0 *                      LSP1
Total 1 displayed, Up 1, Down 0

Egress LSP: 1 sessions
To              From            State   Rt Style Labelin Labelout LSPname
10.102.32.59    192.168.100.5   Up       0  1 FF       0        - LSP2
Total 1 displayed, Up 1, Down 0

Transit LSP: 0 sessions
Total 0 displayed, Up 0, Down 0
```

**Meaning** The **show mpls lsp** command displays information about the configured label-switched paths, including the destination address.

### Verifying Broadband Gateway Status

**Purpose** Verify the status and statistics on the broadband gateway for GGSN/P-GW initiation, call establishment, and Gn-to-Gi connectivity across the MPLS core.

**Action**

```
user@pe1> show unified-edge ggsn-pgw status
    Mobile gateway status:
    Active Subscribers   :              1
    Active Sessions      :              1
    Active Bearers       :              1
    CPU Load (%)         :              0
    Memory Load (%)      :              28

user@pe1> show unified-edge ggsn-pgw statistics gateway MBG1
Control plane statistics:
    Session establishment attempts:             0
    Successful session establishments:          0
    MS/peer initiated session deactivations:    0
    Successful MS/peer initiated deactivations: 0
    Gateway initiated session deactivations:    0
    Successful gateway initiated deactivations: 0
Data plane GTP statistics (Gn/S5/S8):
    Input     packets:          20
    Input     bytes:            2560
    Output    packets:          0
    Output    bytes:            0
    Discarded packets:          0
Data plane GTP statistics (Gi):
    Input     packets:          0
    Input     bytes:            0
    Output    packets:          20
    Output    bytes:            2560
    Discarded packets:          0
```

**Meaning** The **show unified-edge ggsn-pgw status** command displays the status of the broadband gateway, including the number of active subscribers, active sessions, and active bearers. It also displays the CPU load and memory load.

The **show unified-edge ggsn-pgw statistics** command displays the control plane and data plane statistics for the broadband gateway.

### Verifying Mobile Interfaces

**Purpose** Verify that there is no data loss across the mobile interfaces for call establishment and Gn-to-Gi connectivity across the MPLS core.

**Action**

```
user@pe1> show interfaces mif.0 extensive
  Logical interface mif.0 (Index 85) (SNMP ifIndex 812) (Generation 165)
    Flags: SNMP-Traps Encapsulation: GTP-over-MIF
    Bandwidth: 1000mbps
    Traffic statistics:
     Input  bytes  :              6160000
     Output bytes  :              6084936
     Input  packets:                70000
     Output packets:                69147
    Local statistics:
     Input  bytes  :                    0
     Output bytes  :                    0
     Input  packets:                    0
     Output packets:                    0
    Transit statistics:
     Input  bytes  :              6160000                    0 bps
     Output bytes  :              6084936                    0 bps
     Input  packets:                70000                    0 pps
     Output packets:                69147                    0 pps
    Protocol inet, MTU: 1440, Generation: 219, Route table: 12
      Flags: Sendbcast-pkt-to-re, Is-Primary
```

**Meaning** The **show interfaces mif.*number* extensive** command displays detailed information about the specified mobile interface.

## Example: Configuring NAT

This example describes how to configure Network Address Translation (NAT) on the MobileNext Broadband Gateway. This simple example illustrates the NAT44 transition scenario. This example only describes the portions of the configuration related to supporting NAT service sets.



### Requirements

This example uses the following hardware and software components:

- Junos OS Release 11.2W
- Juniper Networks MobileNext Broadband Gateway

## Overview

The broadband gateway should be configured as follows to demonstrate this scenario:

- FPC 1 PIC 0 is the session DPC
- FPC 1 PIC 1 is the Multiservices DPC
- Service interface for NAT is ms-1/1/0
- Service set is applied on mif.0
- NAT pool address range is 19.19.19.1 to 19.19.19.32
- NAT rule matches the user equipment (UE) address range 30.30.0.0/16

## Configuration



### Configuring the Chassis

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
load merge /etc/config/mobility-defaults.conf
set chassis fpc 1 pic 0 apply-groups mobility
set chassis fpc 1 pic 1 adaptive-services service-package extension-provider control-cores
  1
set chassis fpc 1 pic 1 adaptive-services service-package extension-provider data-cores 7
set chassis fpc 1 pic 1 adaptive-services service-package extension-provider
  object-cache-size 14336
set chassis fpc 1 pic 1 adaptive-services service-package extension-provider policy-db-size
  256
set chassis fpc 1 pic 1 adaptive-services service-package extension-provider package
  jservices-nat
set chassis fpc 1 pic 1 adaptive-services service-package extension-provider package
  jservices-alg
set chassis fpc 1 pic 1 adaptive-services service-package syslog daemon any
set chassis fpc 1 pic 1 adaptive-services service-package syslog kernel any
```

**Step-by-Step Procedure**

To configure the chassis:

1. Load and merge the default configuration file for the **mobility** group.

   ```
   [edit]
   user@pe1# load merge /etc/config/mobility-defaults.conf
   ```

2. Configure the **mobility** group on the session DPC.

   ```
   [edit]
   user@pe1# set chassis fpc 1 pic 0 apply-groups mobility
   ```

3. Configure the Multiservices DPC for NAT services. Specify the jservices-nat and jservices-alg packages.

```
[edit]
user@pe1# set chassis fpc 1 pic 1 adaptive-services service-package
  extension-provider control-cores 1
user@pe1# set chassis fpc 1 pic 1 adaptive-services service-package
  extension-provider data-cores 7
user@pe1# set chassis fpc 1 pic 1 adaptive-services service-package
  extension-provider object-cache-size 14336
user@pe1# set chassis fpc 1 pic 1 adaptive-services service-package
  extension-provider policy-db-size 256
user@pe1# set chassis fpc 1 pic 1 adaptive-services service-package
  extension-provider package jservices-nat
user@pe1# set chassis fpc 1 pic 1 adaptive-services service-package
  extension-provider package jservices-alg
```

## Configuring NAT Pools and NAT Rules

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set services nat pool pool_nat44 address-range low 19.19.19.1 high 19.19.19.32
set services nat pool pool_nat44 port automatic
set services nat rule rule_nat44 match-direction input
set services nat rule rule_nat44 term t1 from source-address 30.30.0.0/16
set services nat rule rule_nat44 term t1 then translated source-pool pool_nat44
set services nat rule rule_nat44 term t1 then translated translation-type napt-44
```

**Step-by-Step Procedure**

To configure NAT pools and NAT rules:

1. Configure the NAT pool address as an address range.

```
[edit]
user@pe1# set services nat pool pool_nat44 address-range low 19.19.19.1 high
  19.19.19.32
```

2. Specify that the NAT pool port is a router-assigned port.

```
[edit]
user@pe1# set services nat pool pool_nat44 port automatic
```

3. Configure the NAT rule to match on input.

```
[edit]
user@pe1# set services nat rule rule_nat44 match-direction input
```

4. Specify the input condition for the NAT term.

```
[edit]
user@pe1# set services nat rule rule_nat44 term t1 from source-address 30.30.0.0/16
```

5. Specify the input actions for the NAT term.

```
[edit]
user@pe1# set services nat rule rule_nat44 term t1 then translated source-pool
  pool_eif
```

```
user@pe1# set services nat rule rule_nat44 term t1 then translated translation-type
    napt-44
```

### Configuring Service Sets

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set interfaces ms-1/1/0 unit 0 family inet
set services service-set set_0 nat-rules rule_nat44
set services service-set set_0 interface-service service-interface ms-1/1/0
set interfaces mif unit 0 family inet service input service-set set_0
set interfaces mif unit 0 family inet service output service-set set_0
```

**Step-by-Step Procedure**

To configure service sets:

1. Configure the service interface associated with the service set.

   ```
   [edit]
   user@pe1# set interfaces ms-1/1/0 unit 0 family inet
   ```

2. Configure the service set.

   ```
   [edit]
   user@pe1# set services service-set set_0
   ```

3. Specify the NAT rules.

   ```
   [edit]
   user@pe1# set services service-set set_0 nat-rules rule_nat44
   ```

4. Specify the service interface.

   ```
   [edit]
   user@pe1# set services service-set set_0 interface-service service-interface ms-1/1/0
   ```

5. Associate the service set with the mobile interface.

   ```
   [edit]
   user@pe1# set interfaces mif unit 0 family inet service input service-set set_0
   user@pe1# set interfaces mif unit 0 family inet service output service-set set_0
   ```

## Verification

### Verifying the NAT Pool Information

**Purpose**

Verify information about NAT pools.

**Action**

```
user@pe1> show services nat pool detail
Interface: ms-1/1/0, Service set: set_0
NAT pool: pool_nat44, Translation type: napt-44
Address range: 19.19.19.1-19.19.19.32
Address range: 2.2.2.2-2.2.2.2
Port range: 512-65535, Ports in use: 0, Out of port errors: 0, Max ports used: 0
```

## Example: Configuring a Standalone S-GW

This example describes how to configure the MobileNext Broadband Gateway as a standalone Serving Gateway (S-GW). The emphasis is on S-GW configuration, and does not include many other parameters that a full device configuration requires.



### Requirements

This example uses the following hardware and software components:

- Junos OS Release 11.4W
- Juniper Networks MobileNext Broadband Gateway

### Overview

This example describes how to configure the broadband gateway as a standalone S-GW (SGW-MBG1). The S-GW supports the following configuration:

- The S1-U data, S5, and S11 control interface are in the main routing instance.
- The anchor Packet Forwarding Engine is **pfe-1/0/0** and the anchor services PIC is **ms-5/0/0**.
- The S1-U interface uses **ge-0/0/0** and has IP address **10.44.0.1/16**
- The S5 interface uses **ge-0/0/1** and has IP address **10.5.0.1/16**
- The S11 interface uses **ge-0/0/2** and has IP address **10.2.2.1/16**

### Configuration



#### Configuring the Chassis

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
load merge /etc/config/mobility-defaults.conf
set chassis fpc 1 pic 0 apply-groups mobility
```

```
set chassis fpc 1 forwarding-packages mobility sgw
set interfaces ms-5/0/0 unit 0 family inet address 10.4.1.1/32
set interfaces ge-0/0/0 unit 0 family inet address 10.44.0.1/16
set interfaces ge-0/0/1 unit 0 family inet address 10.5.0.1/16
set interfaces ge-0/0/2 unit 0 family inet address 10.2.2.0.1/16
set interfaces lo0 unit 0 family inet address 10.10.10.1/32
set interfaces lo0 unit 0 family inet address 127.0.0.1/32
set interfaces lo0 unit 0 family inet address 10.255.0.28/32 primary
```

NOTE: This configuration is for the S-GW only. Other statements are needed to make this a complete device configuration.

**Step-by-Step Procedure**

To configure the chassis:

1. Load and merge the default configuration file for the **mobility** group.

   ```
   [edit]
   user@sgw1# load merge /etc/config/mobility-defaults.conf
   ```

2. Configure the **mobility** group on the session DPC.

   ```
   [edit]
   user@sgw1# set chassis fpc 1 pic 0 apply-groups mobility
   ```

   NOTE: You must include every services PIC configured with the **jservices-mobile** package at the **[edit unified-edge gateways sgw *gateway-name* system anchor-spics]** hierarchy level on the broadband gateway. If you do not include the services PIC as an anchor interface, then the services PIC will not be used by the broadband gateway.

3. Configure the interface DPC or MPC at the FPC level.

   ```
   [edit]
   user@sgw1# set chassis fpc 1 forwarding-packages mobility ggsn-pgw
   ```

   NOTE: You must include every Packet Forwarding Engine configured with the **sgw** forwarding package at the **[edit unified-edge gateways sgw *gateway-name* system anchor-pfes]** hierarchy level on the broadband gateway. If you do not specify the Packet Forwarding Engine as an anchor interface, then the Packet Forwarding Engine will not be used by the broadband gateway.

4. Configure the Multiservices PIC interface.

   ```
   [edit]
   user@sgw1# set interfaces ms-5/0/0 unit 0 family inet address 10.10.10.1/32
   ```

5. Configure loopback interfaces.

```
[edit]
user@sgw1# set interfaces lo0 unit 0 family inet address 10.10.10.1/32
user@sgw1# set interfaces lo0 unit 0 family inet address 127.0.0.1/32
user@sgw1# set interfaces lo0 unit 0 family inet address 10.255.0.28/32 primary
```

### Configuring the IPv4 Interfaces

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set interfaces ge-0/0/0 unit 0 family inet address 10.44.0.1/16 description S1-U interface
set interfaces ge-0/0/1 unit 0 family inet address 10.5.0.1/16 description S5 interface
set interfaces ge-0/0/2 unit 0 family inet address 10.2.2.1/16 description S11 interface
```

**Step-by-Step Procedure**

To configure the IPv4 interfaces:

1. Configure IPv4 interfaces for the S1-U interface.

   ```
   [edit]
   user@sgw1# set interfaces ge-0/0/0 unit 0 family inet address 10.44.0.1/16
     description S1-U interface
   ```

2. Configure IPv4 interfaces for the S5 interface.

   ```
   [edit]
   user@sgw1# set interfaces ge-0/0/1 unit 0 family inet address 10.5..0.1/16 description
     S5 interface
   ```

3. Configure IPv4 interfaces for the S11 interface.

   ```
   [edit]
   user@sgw1# set interfaces ge-0/0/2 unit 0 family inet address 10.2.2.1/16 description
     S11 interface
   ```

### Configuring Offline Charging

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways sgw SGW-MBG1 idle-mode-buffering
set unified-edge gateways sgw SGW-MBG1 charging trigger-profiles s_tp offline volume-limit
  1024
set unified-edge gateways sgw SGW-MBG1 charging trigger-profiles s_tp offline volume-limit
  direction both
set unified-edge gateways sgw SGW-MBG1 charging transport-profiles p_tsp offline
  charging-gateways cdr-release r8
set unified-edge gateways sgw SGW-MBG1 charging transport-profiles p_tsp offline
  charging-gateways peer-order peer p_cgf
set unified-edge gateways sgw SGW-MBG1 charging transport-profiles p_tsp offline
  charging-gateways switch-back-time 36
set unified-edge gateways sgw SGW-MBG1 charging charging-profiles p_juniper profile-id
  1
set unified-edge gateways sgw SGW-MBG1 charging charging-profiles p_juniper
  transport-profile p_tsp
```

```
set unified-edge gateways sgw SGW-MBG1 charging charging-profiles p_juniper
  trigger-profile s_tp
set unified-edge gateways sgw SGW-MBG1 charging gtpp transport-protocol tcp
set unified-edge gateways sgw SGW-MBG1 charging gtpp version v0
set unified-edge gateways sgw SGW-MBG1 charging gtpp header-type long
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg
  destination-ipv4-address 10.42.0.2
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg source-interface
  ms-5/0/0,0
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg source-interface
  ipv4-address 10.10.10.1
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg destination-port 3386
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg transport-protocol
  tcp
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg n3-requests 1
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg t3-response 3
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg header-type long
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg pending-queue-size
  1000
set unified-edge gateways sgw SGW-MBG1 charging global-profile default-profile p_juniper
set unified-edge gateways sgw SGW-MBG1 charging global-profile profile-selection-order
  static
```

**Step-by-Step Procedure**

To configure the offline charging profile:

1. Configure charging for the S-GW called SGW-MBG1.

   ```
   [edit]
   user@sgw1# edit unified-edge gateways sgw SGW-MBG1 charging
   ```

2. Specify the global GTP Prime properties to transmit CDRs to the external charging gateway.

   ```
   [edit unified-edge gateways sgw SGW-MBG1 charging]
   user@sgw1# set gtpp transport-protocol tcp
   user@sgw1# set gtpp version v0
   user@sgw1# set gtpp header-type long
   ```

3. Specify the GTP Prime properties for the GTP Prime peers.

   ```
   [edit unified-edge gateways sgw SGW-MBG1 charging]
   user@sgw1# set gtpp peer p_cgf destination-ipv4-address 10.42.0.2
   user@sgw1# set gtpp peer p_cgf source-interface ms-5/0/0.0
   user@sgw1# set gtpp peer p_cgf source-interface ipv4-address 10.10.10.1
   user@sgw1# set gtpp peer p_cgf destination-port 3386
   user@sgw1# set gtpp peer p_cgf transport-protocol tcp
   user@sgw1# set gtpp peer p_cgfw n3-requests 1
   user@sgw1# set gtpp peer p_cgf t3-response 3
   user@sgw1# set gtpp peer p_cgf header-type long
   user@sgw1# set gtpp peer p_cgf pending-queue-size 1000
   ```

4. Configure idle-mode buffering for the S-GW.

   ```
   [edit unified-edge gateways sgw SGW-MBG1 ]
   user@sgw1# set idle-mode-buffering
   ```

5. Configure the transport, trigger, and global profiles referenced by the charging profile for offline charging.

```
[edit unified-edge gateways sgw SGW-MBG1 charging]
user@sgw1# set transport-profiles p_tsp offline charging-gateways cdr-release r8
user@sgw1# set transport-profiles p_tsp offline charging-gateways peer-order peer
  p_cgf
user@sgw1# set transport-profiles p_tsp offline charging-gateways peer-order peer
  p_cfg
user@sgw1# set transport-profiles p_tsp offline charging-gateways switch-back-time
  36
user@sgw1# set trigger-profiles s_tp offline volume-limit 1024
user@sgw1# set trigger-profiles s_tp offline volume-limit direction both
```

6. Configure the charging profiles.

```
[edit unified-edge gateways sgw SGW-MBG1 charging]
user@sgw1# set charging-profiles p_juniper profile-id 1
user@sgw1# set charging-profiles p_juniper transport-profile p_cfg
user@sgw1# set charging-profiles p_juniper trigger-profile s_tp
```

### Configuring System Anchors

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways sgw SGW-MBG1 system anchor-pfes interface pfe-1/0/0
set unified-edge gateways sgw SGW-MBG1 system anchor-spics interface ms-5/0/0
```

**Step-by-Step Procedure**

To configure the anchor Packet Forwarding Engine and services PIC:

1. Configure the anchor Packet Forwarding Engine.

```
[edit unified-edge gateways sgw SGW-MBG1 system]
user@sgw1# set anchor-pfes interface pfe-1/0/0
```

2. Configure the anchor services PIC.

```
[edit unified-edge gateways sgw SGW-MBG1 system]
user@sgw1# set anchor-spics interface ms-5/0/0
```

### Configuring GTP Services

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways sgw SGW-MBG1 gtp interface lo0.0
set unified-edge gateways sgw SGW-MBG1 gtp interface v4-address 10.10.10.1
set unified-edge gateways sgw SGW-MBG1 gtp path-management disable
set unified-edge gateways sgw SGW-MBG1 gtp control path-management disable
set unified-edge gateways sgw SGW-MBG1 gtp data path-management disable
set unified-edge gateways sgw SGW-MBG1 gtp s1u echo-interval 60
set unified-edge gateways sgw SGW-MBG1 gtp s5 echo-n3-requests 5
set unified-edge gateways sgw SGW-MBG1 gtp s5 echo-t3-response 30
set unified-edge gateways sgw SGW-MBG1 gtp s5 echo-interval 60
set unified-edge gateways sgw SGW-MBG1 gtp s11 echo-n3-requests 5
set unified-edge gateways sgw SGW-MBG1 gtp s11 echo-t3-response 30
```

**Step-by-Step Procedure**

To configure GTP services:

1. Configure the GTP services for the S-GW called SGW-MBG1.

```
[edit]
user@sgw1# edit unified-edge gateways sgw SGW-MBG1 gtp
```

2. Configure GTP services for the S1-U, S5, and S11 interfaces with path management disabled. The same address must be specified for all addresses.

```
[edit unified-edge gateways sgw SGW-MBG1 gtp]
user@sgw1# set interface lo0.0
user@sgw1# set interface v4-address 10.10.10.1
user@sgw1# set path-management disable
user@sgw1# set control path-management disable
user@sgw1# set data path-management disable
user@sgw1# set su1 echo-interval 60
user@sgw1# set s5 echo-interval 60
user@sgw1# set s5 echo-n3-requests 5
user@sgw1# set s5 echo-t3-response 30
user@sgw1# set s11 echo-n3-requests 5
user@sgw1# set s11 echo-t3-response 30
```

## Verification

### Verifying Gateway Status

**Purpose** Verify the gateways for the broadband gateway.

**Action**

```
user@pgw-sgw-1> show unified-edge gateways brief

Total number of configured gateways: 1

Gateway name: SGW-MBG1
Gateway type: ggsn-pgw
Gateway id:   1
```

**Meaning** The **show unified-edge gateways brief** command displays information about the configured gateways.

**Related Documentation**

- Example: Configuring a Multigateway P-GW and S-GW on page 575
- Example: Configuring a Collocated P-GW and S-GW on page 564

# Example: Configuring a Collocated P-GW and S-GW

This example describes how to configure the MobileNext Broadband Gateway as a collocated Packet Data Network Gateway (P-GW) and Serving Gateway (S-GW) sharing a chassis. The emphasis is on P-GW and S-GW configuration, and does not include many other parameters that a full device configuration requires.

- Requirements on page 565
- Overview on page 565

## Requirements

This example uses the following hardware and software components:

- Junos OS Release 11.4W
- Juniper Networks MobileNext Broadband Gateway

## Overview

This example describes how to configure the broadband gateway as a collocated P-GW (PGW-MBG1) and S-GW (SGW-MBG1). Both P-GW and S-GW use the same chassis, which is named **pgw-sgw-1**.

- For the S-GW portion of the broadband gateway:
  - The S1-U data, S5, and S11 control interface are in the main routing instance
  - The anchor Packet Forwarding Engines are **pfe-8/0/0**, **pfe-8/1/0**, **pfe-8/2/0**, **pfe-8/3/0**, **pfe-9/0/0**, **pfe-9/1/0**, **pfe-9/2/0**, and **pfe-9/3/0**
  - The anchor services PICs are **ms-0/0/0** and **ms-1/0/0**
  - The S1-U interface uses **ge-5/0/0** and has IP address **10.44.0.1/16**, and S-GW interface **lo0.0** with address **10.8.88.1**
  - The S5 interface uses **ge-5/0/1** and has IP address **10.5.0.1/16**, and S-GW interface **lo0.0** with address **10.7.88.1**
  - The S11 interface uses **ge-5/0/2** and has IP address **10.2.2.1/16**, and S-GW interface **lo0.0** with address **10.6.88.1**
- For the P-GW portion of the broadband gateway:
  - The Gn and Gi interfaces are in the main routing instance
  - The anchor Packet Forwarding Engines are **pfe-10/0/0**, **pfe-10/1/0**, **pfe-10/2/0**, **pfe-10/3/0**, **pfe-10/0/0**, **pfe-11/1/0**, **pfe-11/2/0**, and **pfe-11/3/0**
  - The anchor services PICs are **ms-0/1/0** and **ms-1/1/0**
  - Two APNs (**APN1** and **APN2** are configured to use **mif.0** and **mif.1** respectively, and **lo0.0** address **10.9.88.1**

## Configuration

To configure a collocated P-GW and S-GW, perform these tasks:



- Configuring System Anchors for the Broadband Gateway S-GW and P-GW on page 571
- Configuring GTP Services for the P-GW and S-GW on page 572
- Configure the APNs for the P-GW on page 574


## Configuring the Chassis

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
load merge /etc/config/mobility-defaults.conf
set chassis fpc 0 pic 0 apply-groups mobility
set chassis fpc 0 pic 1 apply-groups mobility
set chassis fpc 1 pic 0 apply-groups mobility
set chassis fpc 1 pic 1 apply-groups mobility
set chassis fpc 5 forwarding-packages mobility sgw
set chassis fpc 7 forwarding-packages mobility sgw
set chassis fpc 8 forwarding-packages mobility sgw
set chassis fpc 9 forwarding-packages mobility sgw
set chassis fpc 10 forwarding-packages mobility ggsn-pgw
set chassis fpc 11 forwarding-packages mobility ggsn-pgw
set interfaces ms-0/0/0 unit 0 family inet description Session PIC for S-GW
set interfaces ms-0/0/0 unit 16000 family inet description Reserved mobile interface
set interfaces ms-0/1/0 unit 0 family inet description Session PIC for P-GW
set interfaces ms-0/1/0 unit 16000 family inet description Reserved mobile interface
set interfaces ms-1/0/0 unit 0 family inet description Session PIC for S-GW
set interfaces ms-1/0/0 unit 16000 family inet description Reserved mobile interface
set interfaces ms-1/1/0 unit 0 family inet description Session PIC for S-GW
set interfaces ms-1/1/0 unit 16000 family inet description Reserved mobile interface
set interfaces ge-5/0/0 unit 0 family inet address 10.44.0.1/16
set interfaces ge-5/0/1 unit 0 family inet address 10.5.0.1/16
set interfaces ge-5/0/2 unit 0 family inet address 10.2.2.1/16
set interfaces xe-10/3/1 unit 0 family inet address 10.3.1.1/24
set interfaces xe-10/3/2 unit 0 family inet address 10.3.2.1/24
set interfaces lo0 unit 0 family inet address 10.6.88.1/32
set interfaces lo0 unit 0 family inet address 10.7.88.1/32
set interfaces lo0 unit 0 family inet address 10.8.88.1/32
set interfaces lo0 unit 0 family inet address 10.9.88.1/32
```

NOTE: This configuration is for the S-GW and P-GW only. Other statements are needed to make this a complete device configuration.

**Step-by-Step Procedure**

To configure the chassis:

1. Load and merge the default configuration file for the **mobility** group.

   ```
   [edit]
   user@pgw-sgw-1# load merge /etc/config/mobility-defaults.conf
   ```

2. Configure the **mobility** group on the session DPC.

   ```
   [edit]
   user@pgw-sgw-1# set chassis fpc 0 pic 0 apply-groups mobility
   ```

```
user@pgw-sgw-1# set chassis fpc 0 pic 1 apply-groups mobility
user@pgw-sgw-1# set chassis fpc 1 pic 0 apply-groups mobility
user@pgw-sgw-1# set chassis fpc 1 pic 1 apply-groups mobility
```

NOTE: You must include every services PIC configured with the jservices-mobile package at the [edit unified-edge gateways sgw *gateway-name* system anchor-spics] hierarchy level on the broadband gateway. If you do not include the services PIC as an anchor interface, then the services PIC will not be used by the broadband gateway.

3. Configure the interface DPC or MPC at the FPC level.

```
[edit]
user@pgw-sgw-1# set chassis fpc 5 forwarding-packages mobility sgw
user@pgw-sgw-1# set chassis fpc 7 forwarding-packages mobility sgw
user@pgw-sgw-1# set chassis fpc 8 forwarding-packages mobility sgw
user@pgw-sgw-1# set chassis fpc 9 forwarding-packages mobility sgw
user@pgw-sgw-1# set chassis fpc 10 forwarding-packages mobility ggsn-pgw
user@pgw-sgw-1# set chassis fpc 11 forwarding-packages mobility ggsn-pgw
```

NOTE: You must include every Packet Forwarding Engine configured with the sgw or ggsn-pgw forwarding package at the [edit unified-edge gateways sgw *gateway-name* system anchor-pfes] or [edit unified-edge gateways ggsn-pgw *gateway-name* system anchor-pfes] hierarchy level on the broadband gateway. If you do not specify the Packet Forwarding Engine as an anchor interface, then the Packet Forwarding Engine will not be used by the broadband gateway.

4. Configure the Multiservices PIC interfaces.

```
[edit]
user@pgw-sgw-1# set interfaces ms-0/0/0 unit 0 family inet description Session
  PIC for S-GW
user@pgw-sgw-1# set interfaces ms-0/0/0 unit 16000 family inet description
  Reserved mobile interface
user@pgw-sgw-1# set interfaces ms-0/1/0 unit 0 family inet description Session
  PIC for P-GW
user@pgw-sgw-1# set interfaces ms-0/1/0 unit 16000 family inet description
  Reserved mobile interface
user@pgw-sgw-1# set interfaces ms-1/0/0 unit 0 family inet description Session
  PIC for S-GW
user@pgw-sgw-1# set interfaces ms-1/0/0 unit 16000 family inet description
  Reserved mobile interface
user@pgw-sgw-1# set interfaces ms-1/1/0 unit 0 family inet description Session
  PIC for P-GW
user@pgw-sgw-1# set interfaces ms-1/1/0 unit 16000 family inet description
  Reserved mobile interface
```

5. Configure physical interfaces.

```
user@pgw-sgw-1# set interfaces ge-5/0/0 unit 0 family inet address 10.44.0.1/16
  description S1-U
user@pgw-sgw-1# set interfaces ge-5/0/1 unit 0 family inet address 10.5.0.1/16
  description S5
user@pgw-sgw-1# set interfaces ge-5/0/2 unit 0 family inet address 10.2.2.1/16
  description S11
user@pgw-sgw-1# set interfaces xe-10/3/1 unit 0 family inet address 10.3.1.1/16
user@pgw-sgw-1# set interfaces xe-10/3/2 unit 0 family inet address 10.3.1.2/16
```

6. Configure loopback interfaces.

```
[edit]
user@pgw-sgw-1# set interfaces lo0 unit 0 family inet address 10.6.88.1/32
user@pgw-sgw-1# set interfaces lo0 unit 0 family inet address 10.7.88.1/32
user@pgw-sgw-1# set interfaces lo0 unit 0 family inet address 10.8.88.1/32
user@pgw-sgw-1# set interfaces lo0 unit 0 family inet address 10.9.88.1/32
```

## Configuring Charging for the P-GW

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways ggsn-pgw PGW-MBG1 charging cdr-profiles cdr_p
  enable-reduced-partial-cdrs
set unified-edge gateways ggsn-pgw PGW-MBG1 charging cdr-profiles cdr_p
  exclude-ie-options serving-node-plmn-identifer
set unified-edge gateways ggsn-pgw PGW-MBG1 charging trigger-profiles p_tp offline
  time-limit 600
set unified-edge gateways ggsn-pgw PGW-MBG1 charging transport-profiles pgw_tsp
  offline charging-gateways cdr-release r8
set unified-edge gateways ggsn-pgw PGW-MBG1 charging transport-profiles pgw_tsp
  offline charging-gateways peer-order peer pgw_cgf
set unified-edge gateways ggsn-pgw PGW-MBG1 charging transport-profiles pgw_tsp
  offline charging-gateways switch-back-time 36
set unified-edge gateways ggsn-pgw PGW-MBG1 charging charging-profiles jnpr-1 profile-id
  1
set unified-edge gateways ggsn-pgw PGW-MBG1 charging charging-profiles jnpr-1
  transport-profile pgw_tsp
set unified-edge gateways ggsn-pgw PGW-MBG1 charging charging-profiles jnpr-1
  cdr-profile cdr_p
set unified-edge gateways ggsn-pgw PGW-MBG1 charging charging-profiles jnpr-1
  trigger-profile p_tp
set unified-edge gateways ggsn-pgw PGW-MBG1 charging gtpp transport-protocol tcp
set unified-edge gateways ggsn-pgw PGW-MBG1 charging gtpp version v2
set unified-edge gateways ggsn-pgw PGW-MBG1 charging gtpp header-type long
set unified-edge gateways ggsn-pgw PGW-MBG1 charging gtpp peer my_cfg
  destination-ipv4-address 10.3.3.3
set unified-edge gateways ggsn-pgw PGW-MBG1 charging gtpp peer my_cfg
  source-interface lo0.0
set unified-edge gateways ggsn-pgw PGW-MBG1 charging gtpp peer my_cfg
  source-interface ipv4-address 10.9.88.1
set unified-edge gateways ggsn-pgw PGW-MBG1 charging gtpp peer my_cfg
  destination-port 3386
set unified-edge gateways ggsn-pgw PGW-MBG1 charging gtpp peer my_cfg
  transport-protocol udp
```

```
set unified-edge gateways ggsn-pgw PGW-MBG1 charging gtpp peer my_cfg n3-requests
  1
set unified-edge gateways ggsn-pgw PGW-MBG1 charging gtpp peer my_cfg t3-response
  5
set unified-edge gateways ggsn-pgw PGW-MBG1 charging gtpp peer my_cfg header-type
  short
set unified-edge gateways ggsn-pgw PGW-MBG1 charging gtpp peer my_cfg
  pending-queue-size 1000
```

**Step-by-Step Procedure**

To configure the charging parameters:

1. Configure charging for the P-GW called PGW-MBG1.

   ```
   [edit]
   user@pgw-sgw-1# edit unified-edge gateways ggsn-pgw PGW-MBG1 charging
   ```

2. Specify the global GTP Prime properties to transmit CDRs to the external charging gateway.

   ```
   [edit unified-edge gateways ggsn-pgw PGW-MBG1 charging]
   user@pgw-sgw-1# set gtpp transport-protocol tcp
   user@pgw-sgw-1# set gtpp version v2
   user@pgw-sgw-1# set gtpp header-type long
   ```

3. Specify the GTP Prime properties for the GTP Prime peers.

   ```
   [edit unified-edge gateways ggsn-pgw PGW-MBG1 charging]
   user@pgw-sgw-1# set gtpp peer my_cgf destination-ipv4-address 10.3.3.3
   user@pgw-sgw-1# set gtpp peer my_cgf source-interface lo0.0
   user@pgw-sgw-1# set gtpp peer my_cgf source-interface ipv4-address 10.9.88.1
   user@pgw-sgw-1# set gtpp peer my_cgf destination-port 3386
   user@pgw-sgw-1# set gtpp peer my_cgf transport-protocol udp
   user@pgw-sgw-1# set gtpp peer my_cgfw n3-requests 1
   user@pgw-sgw-1# set gtpp peer my_cgf t3-response 5
   user@pgw-sgw-1# set gtpp peer my_cgf header-type short
   user@pgw-sgw-1# set gtpp peer my_cgf pending-queue-size 1000
   ```

4. Configure the transport, trigger, and CDR profiles referenced by the charging profile for offline charging.

   ```
   [edit unified-edge gateways ggsn-pgw PGW-MBG1 charging]
   user@pgw-sgw-1# set cdr-profiles cdr_p enable-reduced-partial-cdrs
   user@pgw-sgw-1# set cdr-profiles cdr_p exclude-ie-options
     serving-node-plmn-identifer
   user@pgw-sgw-1# set trigger-profiles p_tp offline time-limit 600
   user@pgw-sgw-1# set transport-profiles pgw_tsp offline charging-gateways
     cdr-release r8
   user@pgw-sgw-1# set transport-profiles pgw_tsp offline charging-gateways
     peer-order peer pgw_cfg
   user@pgw-sgw-1# set transport-profiles pgw_tsp offline charging-gateways
     switch-back-time 36
   ```

5. Configure the charging profiles.

   ```
   [edit unified-edge gateways ggsn-sgw PGW-MBG1 charging]
   user@pgw-sgw-1# set charging-profiles jnpr-1 profile-id 1
   user@pgw-sgw-1# set charging-profiles jnpr-1 transport-profile pgw_tsp
   user@pgw-sgw-1# set charging-profiles jnpr-1 cdr-profile cdr_p
   user@pgw-sgw-1# set charging-profiles jnpr-1 trigger-profile p_tp
   ```

## Configuring Charging for the S-GW

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways sgw SGW-MBG1 idle-mode-buffering
set unified-edge gateways sgw SGW-MBG1 charging trigger-profiles s_tp offline volume-limit
  1024
set unified-edge gateways sgw SGW-MBG1 charging trigger-profiles s_tp offline volume-limit
  direction both
set unified-edge gateways sgw SGW-MBG1 charging transport-profiles p_tsp offline
  charging-gateways cdr-release r8
set unified-edge gateways sgw SGW-MBG1 charging transport-profiles p_tsp offline
  charging-gateways peer-order peer p_cgf
set unified-edge gateways sgw SGW-MBG1 charging transport-profiles p_tsp offline
  charging-gateways switch-back-time 36
set unified-edge gateways sgw SGW-MBG1 charging charging-profiles p_juniper profile-id
  1
set unified-edge gateways sgw SGW-MBG1 charging charging-profiles p_juniper
  transport-profile p_tsp
set unified-edge gateways sgw SGW-MBG1 charging charging-profiles p_juniper
  trigger-profile s_tp
set unified-edge gateways sgw SGW-MBG1 charging gtpp transport-protocol tcp
set unified-edge gateways sgw SGW-MBG1 charging gtpp version v0
set unified-edge gateways sgw SGW-MBG1 charging gtpp header-type long
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg
  destination-ipv4-address 10.42.0.2
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg source-interface
  lo0.0
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg source-interface
  ipv4-address 10.6.88.1
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg destination-port 3386
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg transport-protocol
  tcp
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg n3-requests 1
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg t3-response 3
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg header-type long
set unified-edge gateways sgw SGW-MBG1 charging gtpp peer p_cfg pending-queue-size
  1000
set unified-edge gateways sgw SGW-MBG1 charging global-profile default-profile p_juniper
set unified-edge gateways sgw SGW-MBG1 charging global-profile profile-selection-order
  static
```

**Step-by-Step Procedure**

To configure the offline charging profile:

1. Configure charging for the S-GW called SGW-MBG1.

   ```
   [edit]
   user@pgw-sgw-1# edit unified-edge gateways sgw SGW-MBG1 charging
   ```

2. Specify the global GTP Prime properties to transmit CDRs to the external charging gateway.

   ```
   [edit unified-edge gateways sgw SGW-MBG1 charging]
   user@pgw-sgw-1# set gtpp transport-protocol tcp
   ```

```
user@pgw-sgw-1# set gtpp version v0
user@pgw-sgw-1# set gtpp header-type long
```

3. Specify the GTP Prime properties for the GTP Prime peers.

```
[edit unified-edge gateways sgw SGW-MBG1 charging]
user@pgw-sgw-1# set gtpp peer p_cgf destination-ipv4-address 10.42.0.2
user@pgw-sgw-1# set gtpp peer p_cgf source-interface lo0.0
user@pgw-sgw-1# set gtpp peer p_cgf source-interface ipv4-address 10.6.88.1
user@pgw-sgw-1# set gtpp peer p_cgf destination-port 3386
user@pgw-sgw-1# set gtpp peer p_cgf transport-protocol tcp
user@pgw-sgw-1# set gtpp peer p_cgfw n3-requests 1
user@pgw-sgw-1# set gtpp peer p_cgf t3-response 3
user@pgw-sgw-1# set gtpp peer p_cgf header-type long
user@pgw-sgw-1# set gtpp peer p_cgf pending-queue-size 1000
```

4. Configure idle-mode buffering for the S-GW.

```
[edit unified-edge gateways sgw SGW-MBG1 ]
user@pgw-sgw-1# set idle-mode-buffering
```

5. Configure the transport, trigger, and global profiles referenced by the charging profile for offline charging.

```
[edit unified-edge gateways sgw SGW-MBG1 charging]
user@pgw-sgw-1# set transport-profiles p_tsp offline charging-gateways cdr-release
  r8
user@pgw-sgw-1# set transport-profiles p_tsp offline charging-gateways peer-order
  peer p_cgf
user@pgw-sgw-1# set transport-profiles p_tsp offline charging-gateways peer-order
  peer p_cfg
user@pgw-sgw-1# set transport-profiles p_tsp offline charging-gateways
  switch-back-time 36
user@pgw-sgw-1# set trigger-profiles s_tp offline volume-limit 1024
user@pgw-sgw-1# set trigger-profiles s_tp offline volume-limit direction both
```

6. Configure the charging profile.

```
[edit unified-edge gateways sgw SGW-MBG1 charging]
user@pgw-sgw-1# set charging-profiles p_juniper profile-id 1
user@pgw-sgw-1# set charging-profiles p_juniper transport-profile p_cfg
user@pgw-sgw-1# set charging-profiles p_juniper trigger-profile s_tp
```

## Configuring System Anchors for the Broadband Gateway S-GW and P-GW

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways ggsn-pgw PGW-MBG1 system anchor-pfes interface pfe-10/0/0
set unified-edge gateways ggsn-pgw PGW-MBG1 system anchor-pfes interface pfe-10/1/0
set unified-edge gateways ggsn-pgw PGW-MBG1 system anchor-pfes interface pfe-10/2/0
set unified-edge gateways ggsn-pgw PGW-MBG1 system anchor-pfes interface pfe-10/3/0
set unified-edge gateways ggsn-pgw PGW-MBG1 system anchor-pfes interface pfe-11/0/0
set unified-edge gateways ggsn-pgw PGW-MBG1 system anchor-pfes interface pfe-11/1/0
set unified-edge gateways ggsn-pgw PGW-MBG1 system anchor-pfes interface pfe-11/2/0
set unified-edge gateways ggsn-pgw PGW-MBG1 system anchor-pfes interface pfe-11/3/0
set unified-edge gateways ggsn-pgw PGW-MBG1 system anchor-spics interface ms-1/1/0
```

```
set unified-edge gateways ggsn-pgw PGW-MBG1 system anchor-spics interface ms-0/1/0
set unified-edge gateways sgw SGW-MBG1 system anchor-pfes interface pfe-8/0/0
set unified-edge gateways sgw SGW-MBG1 system anchor-pfes interface pfe-8/1/0
set unified-edge gateways sgw SGW-MBG1 system anchor-pfes interface pfe-8/2/0
set unified-edge gateways sgw SGW-MBG1 system anchor-pfes interface pfe-8/3/0
set unified-edge gateways sgw SGW-MBG1 system anchor-pfes interface pfe-9/0/0
set unified-edge gateways sgw SGW-MBG1 system anchor-pfes interface pfe-9/1/0
set unified-edge gateways sgw SGW-MBG1 system anchor-pfes interface pfe-9/2/0
set unified-edge gateways sgw SGW-MBG1 system anchor-pfes interface pfe-9/3/0
set unified-edge gateways sgw SGW-MBG1 system anchor-spics interface ms-0/0/0
set unified-edge gateways sgw SGW-MBG1 system anchor-spics interface ms-1/0/0
```

**Step-by-Step Procedure**

To configure the anchor Packet Forwarding Engines and services PICs:

1. Configure the anchor Packet Forwarding Engines for the P-GW.

```
[edit unified-edge gateways ggsn-pgw PGW-MBG1 system]
user@pgw-sgw-1# set anchor-pfes interface pfe-10/0/0
user@pgw-sgw-1# set anchor-pfes interface pfe-10/1/0
user@pgw-sgw-1# set anchor-pfes interface pfe-10/2/0
user@pgw-sgw-1# set anchor-pfes interface pfe-10/3/0
user@pgw-sgw-1# set anchor-pfes interface pfe-11/0/0
user@pgw-sgw-1# set anchor-pfes interface pfe-11/1/0
user@pgw-sgw-1# set anchor-pfes interface pfe-11/2/0
user@pgw-sgw-1# set anchor-pfes interface pfe-11/3/0
```

2. Configure the anchor services PIC for the P-GW.

```
[edit unified-edge gateways ggsn-pgw PGW-MBG1 system]
user@pgw-sgw-1# set anchor-spics interface ms-1/1/0
user@pgw-sgw-1# set anchor-spics interface ms-0/1/0
```

3. Configure the anchor Packet Forwarding Engines for the S-GW.

```
[edit unified-edge gateways sgw SGW-MBG1 system]
user@pgw-sgw-1# set anchor-pfes interface pfe-8/0/0
user@pgw-sgw-1# set anchor-pfes interface pfe-8/1/0
user@pgw-sgw-1# set anchor-pfes interface pfe-8/2/0
user@pgw-sgw-1# set anchor-pfes interface pfe-8/3/0
user@pgw-sgw-1# set anchor-pfes interface pfe-9/0/0
user@pgw-sgw-1# set anchor-pfes interface pfe-9/1/0
user@pgw-sgw-1# set anchor-pfes interface pfe-9/2/0
user@pgw-sgw-1# set anchor-pfes interface pfe-9/3/0
```

4. Configure the anchor services PIC for the S-GW.

```
[edit unified-edge gateways sgw SGW-MBG1 system]
user@pgw-sgw-1# set anchor-spics interface ms-0/0/0
user@pgw-sgw-1# set anchor-spics interface ms-1/0/0
```

## Configuring GTP Services for the P-GW and S-GW

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways ggsn-pgw PGW-MBG1 gtp interface lo0.0
set unified-edge gateways ggsn-pgw PGW-MBG1 gtp interface v4-address 10.9.88.1
```

```
set unified-edge gateways ggsn-pgw PGW-MBG1 gtp n3-requests 5
set unified-edge gateways ggsn-pgw PGW-MBG1 gtp t3-response 3
set unified-edge gateways ggsn-pgw PGW-MBG1 gtp echo-interval 60
set unified-edge gateways ggsn-pgw PGW-MBG1 gtp path-management-disable
set unified-edge gateways ggsn-pgw PGW-MBG1 gtp echo-n3-requests 5
set unified-edge gateways sgw SGW-MBG1 gtp path-management disable
set unified-edge gateways sgw SGW-MBG1 gtp control path-management disable
set unified-edge gateways sgw SGW-MBG1 gtp data path-management disable
set unified-edge gateways sgw SGW-MBG1 gtp s1u interface lo0.0
set unified-edge gateways sgw SGW-MBG1 gtp s1u interface v4-address 10.8.88.1
set unified-edge gateways sgw SGW-MBG1 gtp s5 interface lo0.0
set unified-edge gateways sgw SGW-MBG1 gtp s5 interface v4-address 10.7.88.1
set unified-edge gateways sgw SGW-MBG1 gtp s11 interface lo0.0
set unified-edge gateways sgw SGW-MBG1 gtp s11 interface v4-address 10.6.88.1
set unified-edge gateways sgw SGW-MBG1 gtp s11 n3-requests 5
set unified-edge gateways sgw SGW-MBG1 gtp s11 t3-response 5
```

**Step-by-Step Procedure**

To configure GTP services:

1. Configure the GTP services for the P-GW called PGW-MBG1.

   ```
   [edit]
   user@pgw-sgw-1# edit unified-edge gateways pgw PGW-MBG1 gtp
   ```

2. Configure GTP services for the P-GW interfaces with path management disabled.

   ```
   [edit unified-edge gateways pgw PGW-MBG1 gtp]
   user@pgw-sgw-1# set interface lo0.0
   user@pgw-sgw-1# set interface v4-address 10.9.88.1
   user@pgw-sgw-1# set n3-requests 5
   user@pgw-sgw-1# set t3-response 3
   user@pgw-sgw-1# set echo-interval 60
   user@pgw-sgw-1# set path-management disable
   user@pgw-sgw-1# set echo-n3-requests 5
   ```

3. Configure the GTP services for the S-GW called SGW-MBG1.

   ```
   [edit]
   user@pgw-sgw-1# edit unified-edge gateways sgw SGW-MBG1 gtp
   ```

4. Configure GTP services for the S1-U, S5, and S11 interfaces with path management disabled. The same address must be specified for all addresses.

   ```
   [edit unified-edge gateways sgw SGW-MBG1 gtp]
   user@pgw-sgw-1# set path-management disable
   user@pgw-sgw-1# set control path-management disable
   user@pgw-sgw-1# set data path-management disable
   user@pgw-sgw-1# set s1u interface lo0.0
   user@pgw-sgw-1# set s1u interface v4-address 10.8.88.1
   user@pgw-sgw-1# set s5 interface lo0.0
   user@pgw-sgw-1# set s5 interface v4-address 10.7.88.1
   user@pgw-sgw-1# set s11 interface lo0.0
   user@pgw-sgw-1# set s11 interface v4-address 10.6.88.1
   user@pgw-sgw-1# set s11 n3-requests 5
   user@pgw-sgw-1# set s11 t3-response 5
   ```

## Configure the APNs for the P-GW

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1 apn-data-type
  ipv4
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1 mobile interface
  mif.0
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1
  address-assignment local
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1 charging
  default-profile jnpr
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1 dns-server
  primary-v4 10.10.20.120
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1 dns-server
  secondary-v4 10.10.20.119
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1 dns-server
  primary-v6 10:10:20::120
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1 dns-server
  secondary-v6 10:10:20::120
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1 nbns-server
  primary-v4 192.168.23.23
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1 nbns-server
  secondary-v4 192.168.23.24
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1 p-cscf 10:10:10::10
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1 selection-mode
  from-ms
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN2
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN2 apn-data-type
  ipv4
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN2 mobile interface
  mif.1
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1
  address-assignment local
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1 charging
  default-profile jnpr
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1 dns-server
  primary-v4 10.10.20.120
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1 p-cscf 10:10:10::10
set unified-edge gateways ggsn-pgw PGW-MBG1 apn-services apns APN1 selection-mode
  from-ms
```

**Step-by-Step Procedure**

To configure APNs for the P-GW called PGW-MBG1:

1. Configure APN1 for the P-GW called PGW-MBG1.

```
[edit]
user@pgw-sgw-1# edit unified-edge gateways pgw PGW-MBG1 apn-services apns
  APN1
[edit unified-edge gateways pgw PGW-MBG1 apn-services apns APN1]
user@pgw-sgw-1# set apn-data-type ipv4
user@pgw-sgw-1# set mobile-interface mif.0
```

```
user@pgw-sgw-1# set address-assignment local
user@pgw-sgw-1# set charging default-profile jnpr
user@pgw-sgw-1# set charging dns-server primary-v4 10.10.20.119
user@pgw-sgw-1# set charging dns-server secondary-v4 10.10.20.120
user@pgw-sgw-1# set charging dns-server primary-v4 10:10:20::119
user@pgw-sgw-1# set charging dns-server secondary-v4 10:10:20::120
user@pgw-sgw-1# set charging nbns-server primary-v4 192.168.23.23
user@pgw-sgw-1# set charging nbns-server secondary-v4 192.168.23.24
user@pgw-sgw-1# set p-cscf 10:10:10::10
user@pgw-sgw-1# set selection-mode from-ms
```

2. Configure APN2 for the P-GW called PGW-MBG1.

```
[edit]
user@pgw-sgw-1# edit unified-edge gateways pgw PGW-MBG1 apn-services apns
  APN2
[edit unified-edge gateways pgw PGW-MBG1 apn-services apns APN2]
user@pgw-sgw-1# set apn-data-type ipv4
user@pgw-sgw-1# set mobile-interface mif.0
user@pgw-sgw-1# set address-assignment local
user@pgw-sgw-1# set charging default-profile jnpr
user@pgw-sgw-1# set p-cscf 10:10:10::10
user@pgw-sgw-1# set selection-mode from-ms
```

## Verification

### Verifying Gateway Status

**Purpose** Verify the gateways for the broadband gateway.

**Action**

```
user@pgw-sgw-1> show unified-edge gateways brief

Total number of configured gateways: 2

Gateway name: PGW-MBG1
Gateway type: ggsn-pgw
Gateway id:   1

Gateway name: SGW-MBG1
Gateway type: sgw
Gateway id:   2
```

**Meaning** The **show unified-edge gateways brief** command displays information about the configured gateways.

**Related Documentation**

- Example: Configuring a Multigateway P-GW and S-GW on page 575
- Example: Configuring a Standalone S-GW on page 559

# Example: Configuring a Multigateway P-GW and S-GW

This example describes how to configure the MobileNext Broadband Gateway with multiple Packet Data Network Gateways (P-GWs) and Serving Gateways (S-GWs)

sharing a chassis. The emphasis is on P-GW and S-GW configuration, and does not include many other parameters that a full device configuration requires.



## Requirements

This example uses the following hardware and software components:

- Junos OS Release 11.4W
- Juniper Networks MobileNext Broadband Gateway

## Overview

This example describes how to configure the broadband gateway as a multigateway P-GW (PGW1-MBG1 and PGW2-MBG1) and S-GW (SGW1-MBG1 and SGW2-MBG1). All P-GWs and S-GWs use the same chassis, which is named **pgw-sgw-1**.

- For the two S-GWs on the broadband gateway:
  - The S1-U data, S5, and S11 control interface are in the main routing instance
  - The anchor Packet Forwarding Engine for SGW1-MBG1 is **pfe-1/0/0** and the anchor Packet Forwarding Engine for SGW2-MBG1 is **pfe-1/2/0**
  - The anchor services PIC for SGW1-MBG1 is **ms-5/0/0** and the anchor services PIC for SGW2-MBG1 is **ms-5/1/0**
  - The loopback address (**lo0.0**) for SGW1-MBG1 is **10.11.11.11** and the loopback address for SGW2-MBG1 is **10.22.22.22**

NOTE: **The physical interfaces for the S1-U, S5, and S11 interfaces are not listed. These interfaces are established at runtime in a heuristic manner.**

- For the two P-GWs on the broadband gateway:
  - The Gn and Gi interfaces are in the main routing instance and determined by runtime heuristics
  - The anchor Packet Forwarding Engine for PGW1-MBG1 is **pfe-0/0/0** and the anchor Packet Forwarding Engine for PGW2-MBG1 is **pfe-0/2/0**
  - The anchor services PIC for PGW1-MBG1 is **ms-3/0/0** and the anchor services PIC for SGW2-MBG1 is **ms-3/1/0**
  - The APN (**APN1** on PGW1-MBG1) uses mobile interface **mif.3** and the APN (**APN2** on PGW2-MBG1) uses mobile interface **mif.4**

## Configuration

To configure multiple P-GWs and S-GWs on the broadband gateway, perform these tasks:



### Configuring the Chassis

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
load merge /etc/config/mobility-defaults.conf
set chassis fpc 3 pic 0 apply-groups mobility
set chassis fpc 3 pic 1 apply-groups mobility
set chassis fpc 5 pic 0 apply-groups mobility
set chassis fpc 5 pic 1 apply-groups mobility
set chassis fpc 0 forwarding-packages mobility ggsn-pgw
set chassis fpc 1 forwarding-packages mobility sgw
set interfaces ms-3/0/0 unit 0 family inet description Session PIC for PGW1-MBG1
set interfaces ms-3/0/0 unit 0 family inet address 10.4.1.3/32
set interfaces ms-3/1/0 unit 0 family inet description Session PIC for PGW2-MBG1
set interfaces ms-3/1/0 unit 0 family inet address 10.4.1.4/32
set interfaces ms-5/0/0 unit 0 family inet description Session PIC for SGW1-MBG1
set interfaces ms-5/0/0 unit 0 family inet address 10.4.1.1/32
set interfaces ms-5/1/0 unit 0 family inet description Session PIC for SGW2-MBG1
set interfaces ms-5/1/0 unit 0 family inet address 10.4.1.2/32
set interfaces ge-1/0/0 unit 0 family inet address 10.45.0.1/16
set interfaces ge-1/0/1 unit 0 family inet address 10.55.0.1/16
set interfaces ge-1/0/2 unit 0 family inet address 10.66.2.1/16
set interfaces ge-1/0/3 unit 0 family inet address 10.77.2.1/16
set interfaces lo0 unit 0 family inet address 10.11.11.11/32
set interfaces lo0 unit 0 family inet address 10.22.22.22/32
set interfaces lo0 unit 0 family inet address 10.33.33.33/32
set interfaces lo0 unit 0 family inet address 10.44.44.44/32
```

NOTE: This configuration is for the S-GWs and P-GWs only. Other statements are needed to make this a complete device configuration.

**Step-by-Step Procedure**

To configure the chassis:

1. Load and merge the default configuration file for the **mobility** group.

```
[edit]
user@pgw-sgw-1# load merge /etc/config/mobility-defaults.conf
```

2. Configure the **mobility** group on the session DPC.

```
[edit]
user@pgw-sgw-1# set chassis fpc 3 pic 0 apply-groups mobility
user@pgw-sgw-1# set chassis fpc 3 pic 1 apply-groups mobility
user@pgw-sgw-1# set chassis fpc 5 pic 0 apply-groups mobility
user@pgw-sgw-1# set chassis fpc 5 pic 1 apply-groups mobility
```

NOTE: You must include every services PIC configured with the **jservices-mobile** package at the **[edit unified-edge gateways sgw *gateway-name* system anchor-spics]** hierarchy level on the broadband gateway. If you do not include the services PIC as an anchor interface, then the services PIC will not be used by the broadband gateway.

3. Configure the interface DPC or MPC at the FPC level.

```
[edit]
user@pgw-sgw-1# set chassis fpc 0 forwarding-packages mobility sgw
user@pgw-sgw-1# set chassis fpc 1 forwarding-packages mobility ggsn-pgw
```

NOTE: You must include every Packet Forwarding Engine configured with the **sgw** or **ggsn-pgw** forwarding package at the **[edit unified-edge gateways sgw *gateway-name* system anchor-pfes]** or **[edit unified-edge gateways ggsn-pgw *gateway-name* system anchor-pfes]** hierarchy level on the broadband gateway. If you do not specify the Packet Forwarding Engine as an anchor interface, then the Packet Forwarding Engine will not be used by the broadband gateway.

4. Configure the Multiservices PIC interfaces.

```
[edit]
user@pgw-sgw-1# set interfaces ms-3/0/0 unit 0 family inet description Session
  PIC for PGW1-MBG1
user@pgw-sgw-1# set interfaces ms-3/0/0 unit 0 family inet address 10.4.1.3/32
user@pgw-sgw-1# set interfaces ms-3/1/0 unit 0 family inet description Session
  PIC for PGW2-MBG1
user@pgw-sgw-1# set interfaces ms-3/1/0 unit 0 family inet address 10.4.1.4/32
user@pgw-sgw-1# set interfaces ms-5/0/0 unit 0 family inet description Session
  PIC for SGW1-MBG1
user@pgw-sgw-1# set interfaces ms-5/0/0 unit 0 family inet address 10.4.1.1/32
user@pgw-sgw-1# set interfaces ms-5/1/0 unit 0 family inet description Session
  PIC for SGW1-MBG1
user@pgw-sgw-1# set interfaces ms-5/1/0 unit 0 family inet address 10.4.1.2/32
```

5. Configure physical interfaces.

```
user@pgw-sgw-1# set interfaces ge-1/0/0 unit 0 family inet address 10.45.0.1/16
user@pgw-sgw-1# set interfaces ge-1/0/1 unit 0 family inet address 10.55.0.1/16
user@pgw-sgw-1# set interfaces ge-1/0/2 unit 0 family inet address 10.66.2.1/16
user@pgw-sgw-1# set interfaces ge-1/0/3 unit 0 family inet address 10.77.2.1/16
```

6. Configure loopback interfaces.

```
[edit]
user@pgw-sgw-1# set interfaces lo0 unit 0 family inet address 10.11.11.11/32
user@pgw-sgw-1# set interfaces lo0 unit 0 family inet address 10.22.22.22/32
user@pgw-sgw-1# set interfaces lo0 unit 0 family inet address 10.33.33.33/32
user@pgw-sgw-1# set interfaces lo0 unit 0 family inet address 10.44.44.44/32
```

## Configuring Charging for the P-GWs

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging trigger-profiles p_tp exclude
  plmn-change
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging trigger-profiles p_tp exclude
  rat-change
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging trigger-profiles p_tp offline
  volume-limit 1024
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging trigger-profiles p_tp offline
  volume-limit direction both
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging transport-profiles p_tsp offline
  charging-gateways cdr-release r7
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging transport-profiles p_tsp offline
  charging-gateways peer-order peer p_cgf
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging transport-profiles p_tsp offline
  charging-gateways switch-back-time 36
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging charging-profiles p_juniper
  profile-id 1
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging charging-profiles p_juniper
  transport-profile p_tsp
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging charging-profiles p_juniper
  trigger-profile p_tp
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging gtpp transport-protocol tcp
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging gtpp version v0
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging gtpp header-type long
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging gtpp peer p_cfg
  destination-ipv4-address 10.2.2.2
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging gtpp peer p_cfg source-interface
  ms-3/0/0.0
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging gtpp peer p_cfg source-interface
  ipv4-address 10.4.1.3
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging gtpp peer p_cfg destination-port
  3386
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging gtpp peer p_cfg
  transport-protocol tcp
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging gtpp peer p_cfg n3-requests
  1
```

```
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging gtpp peer p_cfg t3-response
  5
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging gtpp peer p_cfg header-type
  long
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging gtpp peer p_cfg
  pending-queue-size 1000
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging global-profile default-profile
  p_juniper
set unified-edge gateways ggsn-pgw PGW1-MBG1 charging global-profile
  profile-selection-order static

[edit]
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging trigger-profiles p_tp exclude
  plmn-change
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging trigger-profiles p_tp exclude
  rat-change
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging trigger-profiles p_tp offline
  volume-limit 1024
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging trigger-profiles p_tp offline
  volume-limit direction both
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging transport-profiles p_tsp offline
  charging-gateways cdr-release r7
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging transport-profiles p_tsp offline
  charging-gateways peer-order peer p_cgf
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging charging-profiles p_juniper
  profile-id 1
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging charging-profiles p_juniper
  transport-profile p_tsp
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging charging-profiles p_juniper
  trigger-profile p_tp
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging gtpp transport-protocol tcp
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging gtpp version v0
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging gtpp header-type long
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging gtpp peer p_cfg
  destination-ipv4-address 10.2.2.2
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging gtpp peer p_cfg source-interface
  ms-3/1/0.0
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging gtpp peer p_cfg source-interface
  ipv4-address 10.4.1.4
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging gtpp peer p_cfg destination-port
  3386
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging gtpp peer p_cfg
  transport-protocol tcp
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging gtpp peer p_cfg n3-requests
  1
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging gtpp peer p_cfg t3-response
  5
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging gtpp peer p_cfg header-type
  long
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging gtpp peer p_cfg
  pending-queue-size 1000
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging global-profile default-profile
  p_juniper
set unified-edge gateways ggsn-pgw PGW2-MBG1 charging global-profile
  profile-selection-order static
```

**Step-by-Step Procedure**

To configure the charging parameters:

1. Configure charging for the P-GW called PGW1-MBG1.

```
[edit]
user@pgw-sgw-1# edit unified-edge gateways ggsn-pgw PGW1-MBG1 charging
```

2. Specify the global GTP Prime properties of PGW1- MBG1 to transmit CDRs to the external charging gateway.

```
[edit unified-edge gateways ggsn-pgw PGW1-MBG1 charging]
user@pgw-sgw-1# set gtpp transport-protocol tcp
user@pgw-sgw-1# set gtpp version v0
user@pgw-sgw-1# set gtpp header-type long
```

3. Specify the GTP Prime properties of PGW1-MBG1 for the GTP Prime peers.

```
[edit unified-edge gateways ggsn-pgw PGW1-MBG1 charging]
user@pgw-sgw-1# set gtpp peer p_cgf destination-ipv4-address 10.2.2.2
user@pgw-sgw-1# set gtpp peer p_cgf source-interface ms-3/0/0.0
user@pgw-sgw-1# set gtpp peer p_cgf source-interface ipv4-address 10.4.1.3
user@pgw-sgw-1# set gtpp peer p_cgf destination-port 3386
user@pgw-sgw-1# set gtpp peer p_cgf transport-protocol tcp
user@pgw-sgw-1# set gtpp peer p_cgf version v0
user@pgw-sgw-1# set gtpp peer p_cgf n3-requests 1
user@pgw-sgw-1# set gtpp peer p_cgf t3-response 5
user@pgw-sgw-1# set gtpp peer p_cgf header-type long
user@pgw-sgw-1# set gtpp peer p_cgf pending-queue-size 1000
```

4. Configure the transport and profiles referenced by the charging profile of PGW1-MBG1 for offline charging.

```
[edit unified-edge gateways ggsn-pgw PGW1-MBG1 charging]
user@pgw-sgw-1# set trigger-profiles p_tp exclude plmn-change
user@pgw-sgw-1# set trigger-profiles p_tp exclude rat-change
user@pgw-sgw-1# set trigger-profiles p_tp offline volume-limit 1024
user@pgw-sgw-1# set trigger-profiles p_tp offline volume-limit direction both
user@pgw-sgw-1# set transport-profiles p_tsp offline charging-gateways cdr-release
  r7
user@pgw-sgw-1# set transport-profiles p_tsp offline charging-gateways peer-order
  peer p_cfg
user@pgw-sgw-1# set transport-profiles p_tsp offline charging-gateways
  switch-back-time 36
```

5. Configure the charging and global profiles for PGW1-MBG1.

```
[edit unified-edge gateways ggsn-sgw PGW1-MBG1 charging]
user@pgw-sgw-1# set charging-profiles p_juniper profile-id 1
user@pgw-sgw-1# set charging-profiles p_juniper transport-profile p_tsp
user@pgw-sgw-1# set charging-profiles p_juniper trigger-profile p_tp
user@pgw-sgw-1# set charging-profiles p_juniper global-profile p_juniper
user@pgw-sgw-1# set charging-profiles p_juniper global-profile
  profile-selection-order static
```

6. Configure charging for the P-GW called PGW2-MBG1.

```
[edit]
user@pgw-sgw-1# edit unified-edge gateways ggsn-pgw PGW2-MBG1 charging
```

7. Specify the global GTP Prime properties of PGW2-MBG1 to transmit CDRs to the external charging gateway.

```
[edit unified-edge gateways ggsn-pgw PGW2-MBG1 charging]
user@pgw-sgw-1# set gtpp transport-protocol tcp
user@pgw-sgw-1# set gtpp version v0
user@pgw-sgw-1# set gtpp header-type long
```

8. Specify the GTP Prime properties of PGW2-MBG1 for the GTP Prime peers.

```
[edit unified-edge gateways ggsn-pgw PGW2-MBG1 charging]
user@pgw-sgw-1# set gtpp peer p_cgf destination-ipv4-address 10.2.2.2
user@pgw-sgw-1# set gtpp peer p_cgf source-interface ms-3/1/0.0
user@pgw-sgw-1# set gtpp peer p_cgf source-interface ipv4-address 10.4.1.4
user@pgw-sgw-1# set gtpp peer p_cgf destination-port 3386
user@pgw-sgw-1# set gtpp peer p_cgf transport-protocol tcp
user@pgw-sgw-1# set gtpp peer p_cgf version v0
user@pgw-sgw-1# set gtpp peer p_cgfw n3-requests 1
user@pgw-sgw-1# set gtpp peer p_cgf t3-response 5
user@pgw-sgw-1# set gtpp peer p_cgf header-type long
user@pgw-sgw-1# set gtpp peer p_cgf pending-queue-size 1000
```

9. Configure the transport and profiles referenced by the charging profile of PGW2-MBG1 for offline charging.

```
[edit unified-edge gateways ggsn-pgw PGW2-MBG1 charging]
user@pgw-sgw-1# set trigger-profiles p_tp exclude plmn-change
user@pgw-sgw-1# set trigger-profiles p_tp exclude rat-change
user@pgw-sgw-1# set trigger-profiles p_tp offline volume-limit 1024
user@pgw-sgw-1# set trigger-profiles p_tp offline volume-limit direction both
user@pgw-sgw-1# set transport-profiles p_tsp offline charging-gateways cdr-release
  r7
user@pgw-sgw-1# set transport-profiles p_tsp offline charging-gateways peer-order
  peer p_cfg
```

10. Configure the charging and global profiles for PGW2-MBG1.

```
[edit unified-edge gateways ggsn-pgw PGW2-MBG1 charging]
user@pgw-sgw-1# set charging-profiles p_juniper profile-id 1
user@pgw-sgw-1# set charging-profiles p_juniper transport-profile p_tsp
user@pgw-sgw-1# set charging-profiles p_juniper trigger-profile p_tp
user@pgw-sgw-1# set charging-profiles p_juniper global-profile p_juniper
user@pgw-sgw-1# set charging-profiles p_juniper global-profile
  profile-selection-order static
```

## Configuring Charging for the S-GWs

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways sgw SGW1-MBG1 charging trigger-profiles s_tp offline
  volume-limit 1024
set unified-edge gateways sgw SGW1-MBG1 charging trigger-profiles s_tp offline
  volume-limit direction both
set unified-edge gateways sgw SGW1-MBG1 charging transport-profiles p_tsp offline
  charging-gateways cdr-release r8
```

```
set unified-edge gateways sgw SGW1-MBG1 charging transport-profiles p_tsp offline
  charging-gateways peer-order peer p_cgf
set unified-edge gateways sgw SGW1-MBG1 charging transport-profiles p_tsp offline
  charging-gateways switch-back-time 36
set unified-edge gateways sgw SGW1-MBG1 charging charging-profiles p_juniper profile-id
  1
set unified-edge gateways sgw SGW1-MBG1 charging charging-profiles p_juniper
  transport-profile p_tsp
set unified-edge gateways sgw SGW1-MBG1 charging charging-profiles p_juniper
  trigger-profile s_tp
set unified-edge gateways sgw SGW1-MBG1 charging gtpp transport-protocol tcp
set unified-edge gateways sgw SGW1-MBG1 charging gtpp version v0
set unified-edge gateways sgw SGW1-MBG1 charging gtpp header-type long
set unified-edge gateways sgw SGW1-MBG1 charging gtpp peer p_cfg
  destination-ipv4-address 10.2.2.2
set unified-edge gateways sgw SGW1-MBG1 charging gtpp peer p_cfg source-interface
  ms-5/0/0.0
set unified-edge gateways sgw SGW1-MBG1 charging gtpp peer p_cfg source-interface
  ipv4-address 10.4.1.1
set unified-edge gateways sgw SGW1-MBG1 charging gtpp peer p_cfg destination-port
  3386
set unified-edge gateways sgw SGW1-MBG1 charging gtpp peer p_cfg transport-protocol
  tcp
set unified-edge gateways sgw SGW1-MBG1 charging gtpp peer p_cfg version v0
set unified-edge gateways sgw SGW1-MBG1 charging gtpp peer p_cfg n3-requests 1
set unified-edge gateways sgw SGW1-MBG1 charging gtpp peer p_cfg t3-response 5
set unified-edge gateways sgw SGW1-MBG1 charging gtpp peer p_cfg header-type long
set unified-edge gateways sgw SGW1-MBG1 charging gtpp peer p_cfg pending-queue-size
  1000
set unified-edge gateways sgw SGW1-MBG1 charging global-profile default-profile p_juniper
set unified-edge gateways sgw SGW1-MBG1 charging global-profile profile-selection-order
  static

[edit]
set unified-edge gateways sgw SGW2-MBG1 charging trigger-profiles p_tp exclude
  plmn-change
set unified-edge gateways sgw SGW2-MBG1 charging trigger-profiles p_tp exclude
  rat-change
set unified-edge gateways sgw SGW2-MBG1 charging trigger-profiles s_tp offline
  volume-limit 1024
set unified-edge gateways sgw SGW2-MBG1 charging trigger-profiles s_tp offline
  volume-limit direction both
set unified-edge gateways sgw SGW2-MBG1 charging transport-profiles p_tsp offline
  charging-gateways cdr-release r8
set unified-edge gateways sgw SGW2-MBG1 charging transport-profiles p_tsp offline
  charging-gateways peer-order peer p_cgf
set unified-edge gateways sgw SGW2-MBG1 charging transport-profiles p_tsp offline
  charging-gateways switchback-time 36
set unified-edge gateways sgw SGW2-MBG1 charging charging-profiles p_juniper profile-id
  1
set unified-edge gateways sgw SGW2-MBG1 charging charging-profiles p_juniper
  transport-profile p_tsp
set unified-edge gateways sgw SGW2-MBG1 charging charging-profiles p_juniper
  trigger-profile s_tp
set unified-edge gateways sgw SGW2-MBG1 charging gtpp transport-protocol tcp
```

```
set unified-edge gateways sgw SGW2-MBG1 charging gtpp version v0
set unified-edge gateways sgw SGW2-MBG1 charging gtpp header-type long
set unified-edge gateways sgw SGW2-MBG1 charging gtpp peer p_cfg
  destination-ipv4-address 10.2.2.2
set unified-edge gateways sgw SGW2-MBG1 charging gtpp peer p_cfg source-interface
  ms-5/1/0.0
set unified-edge gateways sgw SGW2-MBG1 charging gtpp peer p_cfg source-interface
  ipv4-address 10.4.1.2
set unified-edge gateways sgw SGW2-MBG1 charging gtpp peer p_cfg destination-port
  3386
set unified-edge gateways sgw SGW2-MBG1 charging gtpp peer p_cfg transport-protocol
  tcp
set unified-edge gateways sgw SGW2-MBG1 charging gtpp peer p_cfg version v0
set unified-edge gateways sgw SGW2-MBG1 charging gtpp peer p_cfg n3-requests 1
set unified-edge gateways sgw SGW2-MBG1 charging gtpp peer p_cfg t3-response 5
set unified-edge gateways sgw SGW2-MBG1 charging gtpp peer p_cfg header-type long
set unified-edge gateways sgw SGW2-MBG1 charging gtpp peer p_cfg pending-queue-size
  1000
set unified-edge gateways sgw SGW2-MBG1 charging global-profile default-profile p_juniper
set unified-edge gateways sgw SGW2-MBG1 charging global-profile profile-selection-order
  static
```

**Step-by-Step Procedure**

To configure the charging parameters:

1. Configure charging for the S-GW called SGW1-MBG1.

```
[edit]
user@pgw-sgw-1# edit unified-edge gateways sgw SGW1-MBG1 charging
```

2. Specify the global GTP Prime properties of SGW1- MBG1 to transmit CDRs to the external charging gateway.

```
[edit unified-edge gateways sgw SGW1-MBG1 charging]
user@pgw-sgw-1# set gtpp transport-protocol tcp
user@pgw-sgw-1# set gtpp version v0
user@pgw-sgw-1# set gtpp header-type long
```

3. Specify the GTP Prime properties of SGW1-MBG1 for the GTP Prime peers.

```
[edit unified-edge gateways sgw SGW1-MBG1 charging]
user@pgw-sgw-1# set gtpp peer p_cgf destination-ipv4-address 10.2.2.2
user@pgw-sgw-1# set gtpp peer p_cgf source-interface ms-5/0/0.0
user@pgw-sgw-1# set gtpp peer p_cgf source-interface ipv4-address 10.4.1.1
user@pgw-sgw-1# set gtpp peer p_cgf destination-port 3386
user@pgw-sgw-1# set gtpp peer p_cgf transport-protocol tcp
user@pgw-sgw-1# set gtpp peer p_cgf version v0
user@pgw-sgw-1# set gtpp peer p_cgfw n3-requests 1
user@pgw-sgw-1# set gtpp peer p_cgf t3-response 5
user@pgw-sgw-1# set gtpp peer p_cgf header-type long
user@pgw-sgw-1# set gtpp peer p_cgf pending-queue-size 1000
```

4. Configure the transport and profiles referenced by the charging profile of SGW1-MBG1 for offline charging.

```
[edit unified-edge gateways sgw SGW1-MBG1 charging]
user@pgw-sgw-1# set trigger-profiles s_tp offline volume-limit 1024
user@pgw-sgw-1# set trigger-profiles s_tp offline volume-limit direction both
```

```
user@pgw-sgw-1# set transport-profiles p_tsp offline charging-gateways cdr-release
  r8
user@pgw-sgw-1# set transport-profiles p_tsp offline charging-gateways peer-order
  peer p_cfg
user@pgw-sgw-1# set transport-profiles p_tsp offline charging-gateways
  switch-back-time 36
```

5. Configure the charging and global profiles for SGW1-MBG1.

```
[edit unified-edge gateways sgw SGW1-MBG1 charging]
user@pgw-sgw-1# set charging-profiles p_juniper profile-id 1
user@pgw-sgw-1# set charging-profiles p_juniper transport-profile p_tsp
user@pgw-sgw-1# set charging-profiles p_juniper trigger-profile s_tp
user@pgw-sgw-1# set charging-profiles p_juniper global-profile p_juniper
user@pgw-sgw-1# set charging-profiles p_juniper global-profile
  profile-selection-order static
```

6. Configure charging for the S-GW called SGW2-MBG1.

```
[edit]
user@pgw-sgw-1# edit unified-edge gateways sgw SGW2-MBG1 charging
```

7. Specify the global GTP Prime properties of SGW2-MBG1 to transmit CDRs to the external charging gateway.

```
[edit unified-edge gateways sgw SGW2-MBG1 charging]
user@pgw-sgw-1# set gtpp transport-protocol tcp
user@pgw-sgw-1# set gtpp version v0
user@pgw-sgw-1# set gtpp header-type long
```

8. Specify the GTP Prime properties of SGW2-MBG1 for the GTP Prime peers.

```
[edit unified-edge gateways sgw SGW2-MBG1 charging]
user@pgw-sgw-1# set gtpp peer p_cgf destination-ipv4-address 10.2.2.2
user@pgw-sgw-1# set gtpp peer p_cgf source-interface ms-5/1/0.0
user@pgw-sgw-1# set gtpp peer p_cgf source-interface ipv4-address 10.4.1.2
user@pgw-sgw-1# set gtpp peer p_cgf destination-port 3386
user@pgw-sgw-1# set gtpp peer p_cgf transport-protocol tcp
user@pgw-sgw-1# set gtpp peer p_cgfw version v0
user@pgw-sgw-1# set gtpp peer p_cgfw n3-requests 1
user@pgw-sgw-1# set gtpp peer p_cgf t3-response 5
user@pgw-sgw-1# set gtpp peer p_cgf header-type long
user@pgw-sgw-1# set gtpp peer p_cgf pending-queue-size 1000
```

9. Configure the transport and profiles referenced by the charging profile of SGW2-MBG1 for offline charging.

```
[edit unified-edge gateways sgw SGW2-MBG1 charging]
user@pgw-sgw-1# set trigger-profiles p_tp exclude plmn-change
user@pgw-sgw-1# set trigger-profiles p_tp exclude rat-change
user@pgw-sgw-1# set trigger-profiles p_tp offline volume-limit 1024
user@pgw-sgw-1# set trigger-profiles p_tp offline volume-limit direction both
user@pgw-sgw-1# set transport-profiles p_tsp offline charging-gateways cdr-release
  r8
user@pgw-sgw-1# set transport-profiles p_tsp offline charging-gateways peer-order
  peer p_cfg
user@pgw-sgw-1# set transport-profiles p_tsp offline charging-gateways
  switch-back-time 36
```

10. Configure the charging and global profiles for SGW2-MBG1.

```
[edit unified-edge gateways sgw SGW2-MBG1 charging]
user@pgw-sgw-1# set charging-profiles p_juniper profile-id 1
user@pgw-sgw-1# set charging-profiles p_juniper transport-profile p_tsp
user@pgw-sgw-1# set charging-profiles p_juniper trigger-profile s_tp
user@pgw-sgw-1# set charging-profiles p_juniper global-profile p_juniper
user@pgw-sgw-1# set charging-profiles p_juniper global-profile
  profile-selection-order static
```

### Configuring System Anchors for the Broadband Gateway P-GWs Named PGW1-MBG1 and PGW2-MBG2

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways ggsn-pgw PGW1-MBG1 system anchor-pfes interface pfe-0/0/0
set unified-edge gateways ggsn-pgw PGW2-MBG1 system anchor-pfes interface pfe-0/2/0
set unified-edge gateways ggsn-pgw PGW1-MBG1 system anchor-spics interface ms-3/0/0
set unified-edge gateways ggsn-pgw PGW1-MBG1 system anchor-spics interface ms-3/1/0
```

**Step-by-Step Procedure**

To configure the anchor Packet Forwarding Engines and services PICs for the P-GWs:

1. Configure the anchor Packet Forwarding Engine for PGW1-MBG1.

```
[edit unified-edge gateways ggsn-pgw PGW1-MBG1 system]
user@pgw-sgw-1# set anchor-pfes interface pfe-0/0/0
```

2. Configure the anchor Packet Forwarding Engine for PGW2-MBG1.

```
[edit unified-edge gateways ggsn-pgw PGW2-MBG1 system]
user@pgw-sgw-1# set anchor-pfes interface pfe-0/2/0
```

3. Configure the anchor services PIC for PGW1-MBG1.

```
[edit unified-edge gateways ggsn-pgw PGW1-MBG1 system]
user@pgw-sgw-1# set anchor-spics interface ms-3/0/0
```

4. Configure the anchor services PIC for PGW2-MBG1.

```
[edit unified-edge gateways ggsn-pgw PGW2-MBG1 system]
user@pgw-sgw-1# set anchor-spics interface ms-3/1/0
```

### Configuring System Anchors for the Broadband Gateway S-GWs Named SGW1-MBG1 and SGW2-MBG1

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways sgw SGW1-MBG1 system anchor-pfes interface pfe-1/0/0
set unified-edge gateways sgw SGW1-MBG1 system anchor-pfes interface pfe-1/2/0
set unified-edge gateways sgw SGW1-MBG1 system anchor-spics interface ms-5/0/0
set unified-edge gateways sgw SGW1-MBG1 system anchor-spics interface ms-5/1/0
```

**Step-by-Step Procedure**

To configure the anchor Packet Forwarding Engines and services PICs for the S-GWs:

1. Configure the anchor Packet Forwarding Engine for SGW1-MBG1.

   ```
   [edit unified-edge gateways sgw SGW1-MBG1 system]
   user@pgw-sgw-1# set anchor-pfes interface pfe-1/0/0
   ```

2. Configure the anchor Packet Forwarding Engine for SGW2-MBG1.

   ```
   [edit unified-edge gateways sgw SGW2-MBG1 system]
   user@pgw-sgw-1# set anchor-pfes interface pfe-1/2/0
   ```

3. Configure the anchor services PIC for SGW1-MBG1.

   ```
   [edit unified-edge gateways sgw SGW1-MBG1 system]
   user@pgw-sgw-1# set anchor-spics interface ms-5/0/0
   ```

4. Configure the anchor services PIC for SGW2-MBG1.

   ```
   [edit unified-edge gateways sgw SGW2-MBG1 system]
   user@pgw-sgw-1# set anchor-spics interface ms-5/1/0
   ```

### Configuring GTP Services for the P-GWs Named PGW1-MBG1 and PGW2-MBG2

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways ggsn-pgw PGW1-MBG1 gtp interface lo0.0
set unified-edge gateways ggsn-pgw PGW1-MBG1 gtp interface v4-address 10.33.33.33
set unified-edge gateways ggsn-pgw PGW1-MBG1 gtp n3-requests 5
set unified-edge gateways ggsn-pgw PGW1-MBG1 gtp t3-response 3
set unified-edge gateways ggsn-pgw PGW1-MBG1 gtp echo-interval 60
set unified-edge gateways ggsn-pgw PGW1-MBG1 gtp path-management enable
set unified-edge gateways ggsn-pgw PGW1-MBG1 gtp echo-n3-requests 5
set unified-edge gateways ggsn-pgw PGW1-MBG1 gtp echo-t3-response 30
set unified-edge gateways ggsn-pgw PGW2-MBG1 gtp interface lo0.0
set unified-edge gateways ggsn-pgw PGW2-MBG1 gtp interface v4-address 10.44.44.44
set unified-edge gateways ggsn-pgw PGW2-MBG1 gtp n3-requests 5
set unified-edge gateways ggsn-pgw PGW2-MBG1 gtp t3-response 3
set unified-edge gateways ggsn-pgw PGW2-MBG1 gtp echo-interval 60
set unified-edge gateways ggsn-pgw PGW2-MBG1 gtp path-management enable
set unified-edge gateways ggsn-pgw PGW2-MBG1 gtp echo-n3-requests 5
set unified-edge gateways ggsn-pgw PGW2-MBG1 gtp echo-t3-response 30
```

**Step-by-Step Procedure**

To configure GTP services:

1. Configure the GTP services for the P-GW called PGW1-MBG1.

   ```
   [edit]
   user@pgw-sgw-1# edit unified-edge gateways ggsn-pgw PGW1-MBG1 gtp
   ```

2. Configure GTP services for the P-GW interfaces called PGW1-MBG1 with path management disabled.

   ```
   [edit unified-edge gateways pgw PGW1-MBG1 gtp]
   user@pgw-sgw-1# set interface lo0.0
   user@pgw-sgw-1# set interface v4-address 10.33.33.33
   user@pgw-sgw-1# set n3-requests 5
   ```

```
user@pgw-sgw-1# set t3-response 3
user@pgw-sgw-1# set echo-interval 60
user@pgw-sgw-1# set path-management disable
user@pgw-sgw-1# set echo-n3-requests 5
user@pgw-sgw-1# set echo-t3-responses 30
```

3. Configure GTP services for the P-GW interfaces called PGW2-MBG1 with path management disabled.

```
[edit unified-edge gateways pgw PGW2-MBG1 gtp]
user@pgw-sgw-1# set interface lo0.0
user@pgw-sgw-1# set interface v4-address 10.44.44.44
user@pgw-sgw-1# set n3-requests 5
user@pgw-sgw-1# set t3-response 3
user@pgw-sgw-1# set echo-interval 60
user@pgw-sgw-1# set path-management disable
user@pgw-sgw-1# set echo-n3-requests 5
user@pgw-sgw-1# set echo-t3-responses 30
```

### Configuring GTP Services for the S-GW Named SGW1-MBG1 and SGW2-MBG1

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways sgw SGW1-MBG1 gtp interface lo0.0
set unified-edge gateways sgw SGW1-MBG1 gtp interface v4-address 10.11.11.11
set unified-edge gateways sgw SGW1-MBG1 gtp path-management disable
set unified-edge gateways sgw SGW1-MBG1 gtp control path-management disable
set unified-edge gateways sgw SGW1-MBG1 gtp data path-management disable
set unified-edge gateways sgw SGW1-MBG1 gtp s1u echo-interval 60
set unified-edge gateways sgw SGW1-MBG1 gtp s11 ech0-n3-requests 5
set unified-edge gateways sgw SGW1-MBG1 gtp s11 echo-t3-response 30
set unified-edge gateways sgw SGW2-MBG1 gtp interface lo0.0
set unified-edge gateways sgw SGW2-MBG1 gtp interface v4-address 10.22.22.22
set unified-edge gateways sgw SGW2-MBG1 gtp control path-management disable
set unified-edge gateways sgw SGW2-MBG1 gtp data path-management disable
set unified-edge gateways sgw SGW2-MBG1 gtp s1u echo-interval 60
set unified-edge gateways sgw SGW2-MBG1 gtp s11 ech0-n3-requests 5
set unified-edge gateways sgw SGW2-MBG1 gtp s11 echo-t3-response 30
```

**Step-by-Step Procedure**

To configure GTP services:

1. Configure the GTP services for the S-GW called SGW-MBG1.

```
[edit]
user@pgw-sgw-1# edit unified-edge gateways sgw SGW-MBG1 gtp
```

2. Configure GTP services for the S-GW GTP interfaces for SGW1-MBG1 with path management disabled.

```
[edit unified-edge gateways sgw SGW1-MBG1 gtp]
user@pgw-sgw-1# set interface lo0.0
user@pgw-sgw-1# set interface v4-address 10.11.11.11
user@pgw-sgw-1# set path-management disable
user@pgw-sgw-1# set control path-management disable
user@pgw-sgw-1# set data path-management disable
```

```
user@pgw-sgw-1# set s1u echo-interval 60
user@pgw-sgw-1# set s11 echo-n3-requests 5
user@pgw-sgw-1# set s11 echo-t3-resposnes 60
```

3. Configure GTP services for the S-GW GTP interfaces for SGW2-MBG1 with path management disabled.

```
[edit unified-edge gateways sgw SGW2-MBG1 gtp]
user@pgw-sgw-1# set interface lo0.0
user@pgw-sgw-1# set interface v4-address 10.22.22.22
user@pgw-sgw-1# set path-management disable
user@pgw-sgw-1# set control path-management disable
user@pgw-sgw-1# set data path-management disable
user@pgw-sgw-1# set s1u echo-interval 60
user@pgw-sgw-1# set s11 echo-n3-requests 5
user@pgw-sgw-1# set s11 echo-t3-resposnes 60
```

### Configure the APNs for the P-GW

**CLI Quick Configuration**

To quickly configure this example, copy the following commands and paste them into the router terminal window:

```
[edit]
set unified-edge gateways ggsn-pgw PGW1-MBG1 apn-services apns APN1
set unified-edge gateways ggsn-pgw PGW1-MBG1 apn-services apns APN1 mobile interface
  mif.3
set unified-edge gateways ggsn-pgw PGW1-MBG1 apn-services apns APN1
  address-assignment local
set unified-edge gateways ggsn-pgw PGW1-MBG1 apn-services apns APN1 selection-mode
  from-ms
set unified-edge gateways ggsn-pgw PGW2-MBG1 apn-services apns APN2
set unified-edge gateways ggsn-pgw PGW2-MBG1 apn-services apns APN1 mobile interface
  mif.4
set unified-edge gateways ggsn-pgw PGW2-MBG1 apn-services apns APN1
  address-assignment local
set unified-edge gateways ggsn-pgw PGW2-MBG1 apn-services apns APN1 selection-mode
  from-ms
```

**Step-by-Step Procedure**

To configure APNs for the P-GWs called PGW1-MBG1 and PGW2-MBG1:

1. Configure APN1 for the P-GW called PGW-MBG1.

```
[edit]
user@pgw-sgw-1# edit unified-edge gateways ggsn-pgw PGW1-MBG1 apn-services
  apns APN1
[edit unified-edge gateways ggsn-pgw PGW1-MBG1 apn-services apns APN1]
user@pgw-sgw-1# set mobile-interface mif.3
user@pgw-sgw-1# set address-assignment local
user@pgw-sgw-1# set selection-mode from-ms
```

2. Configure APN2 for the P-GW called PGW2-MBG1.

```
[edit]
user@pgw-sgw-1# edit unified-edge gateways ggsn-pgw PGW2-MBG1 apn-services
  apns APN2
[edit unified-edge gateways ggsn-pgw PGW2-MBG1 apn-services apns APN2]
user@pgw-sgw-1# set mobile-interface mif.4
```

```
user@pgw-sgw-1# set address-assignment local
user@pgw-sgw-1# set selection-mode from-ms
```

## Verification

### Verifying Gateway Status

**Purpose** Verify the gateways for the broadband gateway.

**Action**

```
user@pgw-sgw-1> show unified-edge gateways brief

Total number of configured gateways: 4

Gateway name: PGW1-MBG1
Gateway type: ggsn-pgw
Gateway id:   1

Gateway name: PGW2-MBG1
Gateway type: ggsn-pgw
Gateway id:   2

Gateway name: SGW1-MBG1
Gateway type: sgw
Gateway id:   3

Gateway name: SGW2-MBG1
Gateway type: sgw
Gateway id:   4
```

**Meaning** The **show unified-edge gateways brief** command displays information about the configured gateways.

**Related Documentation**

- Example: Configuring a Collocated P-GW and S-GW on page 564
- Example: Configuring a Standalone S-GW on page 559

PART 11

# Complete Configuration Statement Hierarchy and Summary of Statements

CHAPTER 17

# Configuration Statement Hierarchy



## [edit access] Hierarchy Level

```
access {
   radius {
      traceoptions {
         file radius;
            flag send-detail;
            flag recv-detail;
            level all;
            server {
               server name;
            }
```

```
    }
  servers server-name {
      address address;
        source-interface interface {
          ipv4-address address;
        }
        accounting-port port-number;
        accounting-secret password;
        allow-dynamic-requests ;
        authentication-port port-number;
        dead-criteria retries retry-number interval seconds;
        dynamic-requests-secret password;
        retry attempts;
        revert-interval time;
        secret password;
        timeout seconds;
      }
    }
  network-elements name {
        server name {
          priority priority ;
        }
      algorithm ( direct | round-robin);
        maximum-pending-reqs-limit number ;
      }
    }
  network-element-groups name {
      network-element name {
        mandatory;
        }
        broadcast;
      }
    }
  }
}
```

**Related Documentation**

- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit access address-assignment] Hierarchy Level

```
address-assignment {
  mobile-pool-groups {
    group-name {
      [pool-name];
    }
  }
  mobile-pools {
    name {
      ageing-window ageing-window;
      default-pool;
      family (inet | inet6) {
        network {
          [network-prefix] {
            allocation-prefix-length allocation-prefix-length;
```

```
                external-assigned;
                range {
                  [name] {
                    external-assigned;
                    high high;
                    low low;
                  }
                }
              }
            }
            pool-prefetch-threshold pool-prefetch-threshold;
            pool-snmp-trap-threshold pool-snmp-trap-threshold;
            service-mode service-mode-options;
          }
        }
      }
```

Related Documentation
- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit class-of-service] Hierarchy Level

```
class-of-service {
  interfaces {
    mif. number {
      unit logical-unit-number {
        ingress-rewrite-rules {
          [dscp (rewrite-rule-name | default)];
          [dscp-ipv6 (rewrite-rule-name | default)];
          [inet-precedence (rewrite-rule-name | default)];
          }
        }
        rewrite-rules {
          [dscp (rewrite-rule-name | default)] {
            protocol [(gtp-inet-both | gtp-inet-outer)];
          }
          [dscp-ipv6 (rewrite-rule-name | default)] {
            protocol [(mpls | gtp-inet-both | gtp-inet-outer)];
          }
          [inet-precedence (rewrite-rule-name | default)] {
            protocol [(gtp-inet-both | gtp-inet-outer)];
          }
        }
      }
    }
  }
}
```

Related Documentation
- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit interfaces ams] Hierarchy Level

```
interfaces amsx {
```

```
    hold-time {
      ...
    }
    layer2-policer {
      ...
    }
    load-balancing-options {
      high-availability-options {
        many-to-one {
          preferred-backup preferred-backup;
        }
      }
      member-failure-options {
        drop-member-traffic {
          enable-rejoin;
          rejoin-timeout rejoin-timeout;
        }
        redistribute-all-traffic {
          enable-rejoin;
        }
      }
      member-interface interface-name;
    }
    multi-chassis-protection {
      ...
    }
    services-options {
      ...
    }
    traceoptions {
      ...
    }
    unit interface-unit-number {
      dial-options {
        (dedicated | shared);
        ipsec-interface-id ipsec-interface-id;
      }
      family family;
      load-balancing-options {
        preferred-active interface-name;
      }
    }
  }
```

**Related Documentation**

- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit interfaces apfe] Hierarchy Level

```
interfaces apfex {
  anchoring-options {
    apfe-group-set apfe-group-set;
    primary-list {
      [anchoring-device-name];
    }
```

```
    secondary anchoring-device-name;
    warm-standby;
  }
  hold-time {
    ...
  }
  layer2-policer {
    ...
  }
  multi-chassis-protection {
    ...
  }
  traceoptions {
    ...
  }
}
```

Related Documentation
- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit interfaces mif] Hierarchy Level

```
interfaces mif {
  description description;
  disable;
  mtu mtu-size;
  multi-chassis-protection { ... }
  no-traps;
  traceoptions { ... }
  unit interface-unit-number {
    clear-dont-fragment-bit;
    description description;
    disable;
    family family-name {...}
    filter {
      input input-filter;
      output output-filter;
    }
    (no-traps | traps);
  }
}
```

Related Documentation
- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit routing-instance system] Hierarchy Level

```
services {
  dhcp-proxy-client {
    dhcpv4-profiles profile-name {
      bind-interface interface-name;
      dead-server-retry-interval interval-in-seconds;
      dead-server-successive-retry-attempt number-of-attempts;
      dhcp-server-selection-algorithm (highest-priority-server | round-robin);
      lease-time time-in-seconds;
```

```
    pool-name pool-name;
    retransmission-attempt  number-of-attempts;
    retransmission-interval interval-in-seconds;
    servers ip-address {
      priority value;
    }
  }
  dhcpv6-profiles profile-name {
    bind-interface interface-name;
    lease-time time-in-seconds;
    pool-name pool-name;
    retransmission-attempt  number-of-attempts;
    retransmission-interval interval-in-seconds;
  }
  traceoptions {
    file {
      filename;
      files files;
      match match;
      (no-world-readable | world-readable);
      size size;
    }
    flag {
      flag;
    }
    no-remote-trace;
  }
}
```

**Related Documentation**

- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit services hcm] Hierarchy Level

```
hcm {
  tag-attribute [attr-name];
  tag-rule rule-name {
    term term-name {
      from {
        destination-address {
          (any-unicast | any-unicast except);
          [prefix];
        }
        destination-address-range {
          [high address low address] [except];
        }
        destination-port-range {
          [high port-number low port-number];
        }
        destination-ports [value];
        destination-prefix-list {
          (prefix-name | prefix-name except);
        }
      }
      then{
```

```
            count;
            tag tag-name {
              encrypt {
                hash algorithm;
                prefix hash-prefix;
              }
              tag-attribute tag-attr-name;
              tag-header header;
              tag-separator separator;
            }
          }
        }
      }
      tag-rule-set rule-set-name {
        [rule rule-name];
      }
    }
```

Related Documentation
- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit services ip-reassembly] Hierarchy Level

```
ip-reassembly {
  profile profile-name {
    max-reassembly-pending-packets number;
    timeout in-seconds;
  }
}
```

Related Documentation
- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit services service-set] Hierarchy Level

```
service-set service-set-name {
  interface-service {
    load-balancing-options {
      hash-keys {
        egress-key (destination-ip | source-ip);
        ingress-key (destination-ip | source-ip);
        resource-triggered;
      }
    }
    service-interface interface-name.unit-number;
  }
  [tag-rule-sets rule-set-name];
  [tag-rules rule-name];
  service-set-options {
    subscriber-awareness;
  }
}
```

Related Documentation
- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit unified-edge] Hierarchy Level

Each of the following topics lists the statements at a subhierarchy of the **[edit unified-edge]** hierarchy.

- [edit unified-edge aaa] Hierarchy Level on page 600
- [edit unified-edge cos-cac] Hierarchy Level on page 602
- [edit unified-edge gateways] Hierarchy Level on page 604
- [edit unified-edge local-policies] Hierarchy Level on page 623
- [edit unified-edge mobile-options] Hierarchy Level on page 623
- [edit unified-edge resource-management] Hierarchy Level on page 624

Related Documentation
- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit unified-edge aaa] Hierarchy Level

```
unified-edge {
  aaa {
    traceoptions {
    }
    mobile-profiles {
      map-name {
        radius {
          authentication {
            network-element name;
          }
          accounting {
            network-element name;
              network-element-group group-name;
              stop-on-failure;
              stop-on-access-deny;
            send-accounting-on;
            trigger {
              interim-interval minutes;
                no-cos-change;
                no-deferred-ipv4-address-update;
                no-ms-timezone-change;
                no-plmn-change;
                no-rat-change;
                no-sgw-change;
                no-user-location-information-change;
              }
          }
          options {
            nas-identifier-prefix identifier-value;
          }
```

```
attributes {
  ignore {
    output-filter;
      framed-ip-netmask;
    input-filter;
  }
  exclude {
    accounting-authentic [accounting-start | accounting-interim |
      accounting-stop];
    accounting-delay-time [accounting-start | accounting-interim |
      accounting-stop];
    accounting-terminate-cause [accounting-stop];
    all-3gpp [access-request | accounting-start | accounting-stop |
      accounting-interim];
    called-station-id [access-request | accounting-start | accounting-interim |
      accounting-stop];
    calling-station-id [access-request | accounting-start | accounting-interim |
      accounting-stop];
    charging-id [access-request | accounting-interim | accounting-start |
      accounting-stop];
    event-timestamp [accounting-start | accounting-interim | accounting-stop];
    ggsn-address [access-request | accounting-interim | accounting-start |
      accounting-stop];
    gprs-negotiated-qos [access-request | accounting-interim | accounting-start
      | accounting-stop];
    imeisv [access-request | accounting-start];
    imsi [access-request | accounting-start | accounting-stop |
      accounting-interim];
    imsi-mcc-mnc [access-request | accounting-start | accounting-stop |
      accounting-interim];
    input-gigapackets [accounting-interim | accounting-stop];
    input-gigawords [accounting-interim | accounting-stop];
    input-packets [accounting-interim | accounting-stop];
    nas-identifier [access-request | accounting-interim | accounting-start
      |accounting-stop];
    nas-ip-address [access-request | accounting-on |accounting-off |
      accounting-start | accounting-interim | accounting-stop];
    nas-port-type [access-request | accounting-interim | accounting-start |
      accounting-stop];
    nsapi [access-request | accounting-interim | accounting-start |
      accounting-stop];
    output-gigapackets [accounting-interim | accounting-stop];
    output-gigawords [accounting-interim | accounting-stop];
    output-packets [accounting-interim | accounting-stop];
    selection-mode [access-request | accounting-interim | accounting-start |
      accounting-stop];
    sgsn-mcc-mnc [access-request | accounting-start | accounting-interim |
      accounting-stop];
    user-location-info [access-request | accounting-start | accounting-stop |
      accounting-interim];
  }
 }
 }
 }
 }
}
```

```
}
```

**Related Documentation**

- [edit unified-edge] Hierarchy Level on page 600
- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit unified-edge cos-cac] Hierarchy Level

```
unified-edge {
  cos-cac {
    classifier-profiles {
      name {
        description description;
        qos-class-identifier qci-value {
          forwarding-class class-name;
          loss-priority (high | low);
        }
      }
    }
    cos-policy-profiles {
      name {
        aggregated-qos-control {
          maximum-bit-rate-downlink {
            mbr-downlink;
            reject;
            upgrade;
          }
          maximum-bit-rate-uplink {
            mbr-uplink;
            reject;
            upgrade;
          }
        }
        allocation-retention-priority {
          priority-value;
          reject;
        }
        default-bearer-qci {
          qci-value;
          reject;
          upgrade;
        }
        description description;
        pdp-qos-control {
          guaranteed-bit-rate-downlink {
            gbr-downlink;
            reject;
            upgrade;
          }
          guaranteed-bit-rate-uplink {
            gbr-uplink;
            reject;
            upgrade;
          }
          maximum-bit-rate-downlink {
```

```
            mbr-downlink;
            reject;
            upgrade;
          }
          maximum-bit-rate-uplink {
            mbr-uplink;
            reject;
            upgrade;
          }
          qci qci-value {
            maximum-bit-rate-downlink {
              mbr-downlink;
              reject;
              upgrade;
            }
            maximum-bit-rate-uplink {
              mbr-uplink;
              reject;
              upgrade;
            }
          }
        }
        policer-action {
          gbr-bearer {
            exceed-action (drop | transmit);
            violate-action (set-loss-priority-high | transmit);
          }
          non-gbr-bearer {
            violate-action (set-loss-priority-high | transmit);
          }
        }
      }
    }
    gbr-bandwidth-pools {
      name {
        downgrade-gtp-v1-gbr-bearers;
        maximum-bandwidth maximum-bandwidth;
      }
    }
    resource-threshold-profiles {
      name {
        bearers-load {
          high {
            percentage percentage;
            priority-level priority-level;
          }
          low {
            percentage percentage;
            priority-level priority-level;
          }
        }
        cpu {
          high {
            percentage percentage;
            priority-level priority-level;
          }
```

```
            low {
              percentage percentage;
              priority-level priority-level;
            }
          }
          description description;
          memory {
            high {
              percentage percentage;
              priority-level priority-level;
            }
            low {
              percentage percentage;
              priority-level priority-level;
            }
          }
        }
      }
    }
```

Related Documentation
- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit unified-edge gateways] Hierarchy Level

Each of the following topics lists the statements at a sub-hierarchy of the **[edit unified-edge gateways]** hierarchy.

- [edit unified-edge gateways ggsn-pgw <gateway-name>] Hierarchy Level on page 604
- [edit unified-edge gateways sgw <gateway-name>] Hierarchy Level on page 615

Related Documentation
- [edit unified-edge] Hierarchy Level on page 600
- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit unified-edge gateways ggsn-pgw <gateway-name>] Hierarchy Level

```
ggsn-pgw gateway-name {
  anchor-pfe-ipv4-nbm-prefixes maximum-ipv4-prefixes;
  anchor-pfe-ipv6-nbm-prefixes maximum-ipv6-prefixes;
  apn-services {
    apns {
      [name] {
        aaa-profile aaa-profile;
        address-assignment {
          aaa;
          allow-static-ip-address {
            no-address-verify;
          }
          dhcp-proxy-client {
            aaa-override;
          }
          dhcpv4-proxy-client-profile {
```

```
      logical-system logical-system;
      pool-name pool-name;
      profile-name profile-name;
      routing-instance routing-instance;
    }
    dhcpv6-proxy-client-profile{
      logical-system logical-system;
      pool-name pool-name;
      profile-name profile-name;
      routing-instance routing-instance;
    }
    inet-pool {
      exclude-pools [value];
      group group;
      pool pool;
    }
    inet6-pool {
      exclude-v6pools [value];
      group group;
      pool pool;
    }
    local {
      aaa-override;
    }
}
allow-network-behind-mobile;
anonymous-user {
    password password;
    (use-apnname | use-imsi | use-msisdn | user-name username);
}
apn-data-type (ipv4 | ipv4v6 | ipv6);
apn-type (real | virtual | virtual-pre-authenticate);
block-visitors;
charging {
    default-profile default-profile;
    home-profile home-profile;
    profile-selection-order [profile-selection-method];
    roamer-profile roamer-profile;
    visitor-profile visited-profile;
}
description description;
dns-server {
    primary-v4 primary-v4;
    primary-v6 primary-v6;
    secondary-v4 secondary-v4;
    secondary-v6 secondary-v6;
}
idle-timeout idle-timeout;
idle-timeout-direction (both | uplink);
inter-mobile-traffic {
    (deny | redirect redirect);
}
local-policy-profile local-policy-profile;
maximum-bearers maximum-bearers;
mobile-interface mobile-interface;
nbns-server {
```

```
            primary-v4 primary-v4;
            secondary-v4 secondary-v4;
          }
          network-behind-mobile {
            imsi imsi {
              prefix-v4 [ipv4-prefix];
              prefix-v6 [ipv6-prefix];
            }
          }
          p-cscf{
            [address];
          }
          restriction-value restriction-value;
          selection-mode {
            (from-ms | from-sgsn | no-subscribed);
          }
          service-mode service-mode-options;
          service-selection-profile service-selection-profile;
          session-timeout session-timeout;
          verify-source-address {
            disable;
          }
          wait-accounting;
        }
      }
    }
    call-rate-statistics {
      history history;
      interval interval;
    }
    charging {
      cdr-profiles profile-name {
        description string;
        enable-reduced-partial-cdrs;
        exclude-ie-options {
          apn-ni;
          apn-selection-mode;
          cc-selection-mode;
          dynamic-address;
          list-of-service-data;
          list-of-traffic-volumes;
          lrsn;
          ms-time-zone;
          network-initiation;
          node-id;
          pdn-connection-id;
          pdppdn-type;
          pgw-address-used; # S-GW only
          pgw-plmn-identifier;
          rat-type;
          record-sequence-number;
          served-imeisv;
          served-msisdn;
          served-pdppdn-address;
          serving-node-plmn-identifier;
          sgw-change; # S-GW only
```

```
        start-time;
        stop-time;
        user-location-information;
    }
}
charging-profiles profile-name {
    cdr-profile profile-name;
    default-rating-group rg-num;
    default-service-id id-num;
    description string;
    profile-id id-num;
    transport-profile profile-name;
    trigger-profile profile-name;
    service-mode maintenance;
}
gtpp {
    destination-port port-number;
    down-detect-time duration;
    echo-interval duration;
    header-type (long | short);
    n3-requests requests;
    no-path-management;
    pending-queue-size value;
    peer peer-name {
        destination-ipv4-address address;
        destination-port port-number;
        down-detect-time duration;
        echo-interval duration;
        header-type (long | short);
        n3-requests requests;
        no-path-management;
        pending-queue-size value;
        reconnect-time duration;
        source-interface interface-name [ipv4-address address];
        t3-response response-interval;
        transport-protocol (tcp | udp);
        version (v0 | v1 | v2);
    }
    reconnect-time duration;
    source-interface {
        interface-name;
        ipv4-address address;
    }
    t3-response response-interval;
    transport-protocol (tcp | udp);
    version (v0 | v1 | v2);
}
local-persistent-storage-options {
    cdrs-per-file value;
    disable-replication;
    disk-space-policy {
        watermark-level-1 {
            notification-level (both | snmp-alarm | syslog);
            percentage value;
        }
        watermark-level-2 {
```

```
            notification-level (both | snmp-alarm | syslog);
            percentage value;
          }
          watermark-level-3 {
            notification-level (both | snmp-alarm | syslog);
            percentage value;
          }
        }
        file-age {
          age;
          disable;
        }
        file-creation-policy (shared-file | unique-file);
        file-format (3gpp | raw-asn);
        file-name-private-extension string;
        file-size {
          size;
          disable;
        }
        traceoptions {
          file file-name <files number> <match regular-expression> <no-world-readable |
            world-readable> <size size>;
          flag flag;
          level (all | critical | error | info | notice | verbose | warning);
          no-remote-trace;
        }
        user-name string;
        world-readable;
      }
      traceoptions {
        file file-name <files number> <no-world-readable | world-readable> <size size>;
        flag flag;
        level (all | critical | error | info | notice | verbose | warning);
        no-remote-trace;
      }
      transport-profiles profile-name {
        description string;
        offline {
          charging-gateways {
            cdr-aggregation-limit value;
            cdr-release (r7 | r8 | r99);
            mtu value;
            peer-order {
              [peer charging-gateway-peer-name];
            }
            persistent-storage-order {
              local-storage;
            }
            switch-back-time seconds;
          }
        }
        service-mode maintenance;
      }
      trigger-profiles profile-name {
        description string;
        offline {
```

```
        container-limit value;
        exclude {
          ms-timezone-change;
          plmn-change;
          qos-change;
          rat-change;
          sgsn-sgw-change;
          user-location-change;
        }
        sgsn-sgw-change-limit value;
        time-limit value;
        volume-limit {
          value;
          direction (both | uplink);
        }
      }
      tariff-time-list {
        [tariff-time];
      }
    }
  }
  gtp {
    control {
      dscp-code-point value;
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      forwarding-classclass-name;
      interface {
        interface-name;
        v4-address v4-address;
      }
      n3-requests requests;
      no-response-cache;
      path-management (disable | enable);
      response-cache-timeoutt interval-in-seconds;
      t3-response response-interval;
    }
    data {
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      error-indication-interval seconds;
      interface {
        interface-name;
        v4-address v4-address;
      }
      path-management (disable | enable);
    }
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    gn {
      control {
        dscp-code-point value;
        echo-interval interval;
```

```
        echo-n3-requests requests;
        echo-t3-response response-interval;
        forwarding-classclass-name;
        interface {
          interface-name;
          v4-address v4-address;
        }
        n3-requests requests;
        path-management (disable | enable);
        t3-response response-interval;
      }
      data {
        echo-interval interval;
        echo-n3-requests requests;
        echo-t3-response response-interval;
        interface {
          interface-name;
          v4-address v4-address;
        }
        n3-requests requests;
        path-management (disable | enable);
        t3-response response-interval;
      }
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      interface {
        interface-name;
        v4-address v4-address;
      }
      n3-requests requests;
      path-management (disable | enable);
      t3-response response-interval;
    }
    gp {
      control {
        dscp-code-point value;
        echo-interval interval;
        echo-n3-requests requests;
        echo-t3-response response-interval;
        forwarding-classclass-name;
        interface {
          interface-name;
          v4-address v4-address;
        }
        n3-requests requests;
        path-management (disable | enable);
        t3-response response-interval;
      }
      data {
        echo-interval interval;
        echo-n3-requests requests;
        echo-t3-response response-interval;
        interface {
          interface-name;
          v4-address v4-address;
```

```
        }
        n3-requests requests;
        path-management (disable | enable);
        t3-response response-interval;
      }
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      interface {
        interface-name;
        v4-address v4-address;
      }
      n3-requests requests;
      path-management (disable | enable);
      t3-response response-interval;
    }
    interface {
      interface-name;
      v4-address v4-address;
    }
    n3-requests requests;
    path-management (disable | enable);
    peer-group name {
      control {
        support-16-bit-sequence;
      }
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      n3-requests requests;
      path-management (disable | enable);
      peer {
        [ip-addr-prefix];
      }
      routing-instance routing-identifier;
      t3-response response-interval;
    }
    peer-history number;
    s5 {
      control {
        dscp-code-point value;
        echo-interval interval;
        echo-n3-requests requests;
        echo-t3-response response-interval;
        forwarding-classclass-name;
        interface {
          interface-name;
          v4-address v4-address;
        }
        n3-requests requests;
        path-management (disable | enable);
        support-16-bit-sequence;
        t3-response response-interval;
      }
      data {
        echo-interval interval;
```

```
        echo-n3-requests requests;
        echo-t3-response response-interval;
        interface {
          interface-name;
          v4-address v4-address;
        }
        n3-requests requests;
        path-management (disable | enable);
        t3-response response-interval;
      }
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      interface {
        interface-name;
        v4-address v4-address;
      }
      n3-requests requests;
      path-management (disable | enable);
      t3-response response-interval;
    }
    s8 {
      control {
        dscp-code-point value;
        echo-interval interval;
        echo-n3-requests requests;
        echo-t3-response response-interval;
        forwarding-classclass-name;
        interface {
          interface-name;
          v4-address v4-address;
        }
        n3-requests requests;
        path-management (disable | enable);
        support-16-bit-sequence;
        t3-response response-interval;
      }
      data {
        echo-interval interval;
        echo-n3-requests requests;
        echo-t3-response response-interval;
        interface {
          interface-name;
          v4-address v4-address;
        }
        n3-requests requests;
        path-management (disable | enable);
        t3-response response-interval;
      }
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      interface {
        interface-name;
        v4-address v4-address;
      }
```

```
      n3-requests requests;
      path-management (disable | enable);
      t3-response response-interval;
    }
    t3-response response-interval;
    traceoptions {
      file filename {
        files files;
        (no-world-readable | world-readable);
        size size;
      }
      flag {
        flag;
      }
      level level;
      no-remote-trace;
    }
  }
  home-plmn {
    mcc [mcc] {
      mnc [mnc];
    }
  }
  inline-services {
    ip-reassembly;
  }
  ip-reassembly-profile {
    profile-name;
  }
  ipv6-router-advertisement {
    current-hop-limit current-hop-limit;
    disable;
    maximum-advertisement-interval maximum-advertisement-interval;
    maximum-initial-advertisement-interval maximum-initial-advertisement-interval;
    maximum-initial-advertisements maximum-initial-advertisements;
    minimum-advertisement-interval minimum-advertisement-interval;
    reachable-time reachable-time;
    retransmission-timer retransmission-timer;
    router-lifetime router-lifetime;
  }
  local-policy-profile local-policy-profile;
  maximum-bearers maximum-bearers;
  preemption {
    enable;
    gtpv1-pci-disable;
    gtpv1-pvi-disable;
  }
  service-mode maintenance;
  service-selection-profiles {
    profile-name {
      term name {
        from {
          anonymous-user;
          domain-name domain-name;
          charging-characteristics charging-characteristics;
          imei imei;
```

```
            imsi imsi;
            maximum-bearers maximum-bearers;
            msisdn msisdn;
            pdn-type (ipv4 | ipv4v6 | ipv6);
            peer peer;
            peer-routing-instance peer-routing-instance;
            plmn {
              except;
              mcc {
                mcc;
                mnc mnc;
              }
            }
            roaming-status (home | roamer | visitor);
          }
          then {
            accept;
            apn-name apn-name;
            redirect-peer redirect-peer;
            reject;
          }
        }
      }
    }
    software-datapath {
      traceoptions {
        file filename {
          files files;
          match match;
          size size;
          (no-world-readable | world-readable);
        }
        flag {
          flag;
        }
        level level;
        no-remote-trace;
      }
    }
    system {
      pfes {
        [interface interface-name];
      }
      service-pics {
        [interface interface-name];
      }
      session-pics {
        [interface interface-name];
      }
    }
    traceoptions {
      file filename {
        files files;
        match match;
        (no-world-readable | world-readable);
        size size;
```

```
    }
    flag {
      flag;
    }
    level level;
    no-remote-trace;
  }
}
```

**Related Documentation**

- [edit unified-edge gateways] Hierarchy Level on page 604
- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit unified-edge gateways sgw <gateway-name>] Hierarchy Level

```
sgw gateway-name {
  anchor-pfe-default-bearers-percentage default-bearers-percentage;
  anchor-pfe-guaranteed-bandwidth anchor-pfe-guaranteed-bandwidth;
  anchor-pfe-maximum-bearersmaximum-bearers;
  call-rate-statistics {
    history history;
    interval interval;
  }
  charging {
    cdr-profiles profile-name {
      description string;
      enable-reduced-partial-cdrs;
      exclude-ie-options {
        apn-ni;
        apn-selection-mode;
        cc-selection-mode;
        dynamic-address;
        list-of-service-data;
        list-of-traffic-volumes;
        lrsn;
        ms-time-zone;
        network-initiation;
        node-id;
        pdn-connection-id;
        pdppdn-type;
        pgw-address-used;
        pgw-plmn-identifier;
        rat-type;
        record-sequence-number;
        served-imeisv;
        served-msisdn;
        served-pdppdn-address;
        serving-node-plmn-identifier;
        sgw-change;
        start-time;
        stop-time;
        user-location-information;
      }
    }
    charging-profiles profile-name {
```

```
    cdr-profile profile-name;
    default-rating-group rg-num;
    default-service-id id-num;
    description string;
    profile-id id-num;
    transport-profile profile-name;
    trigger-profile profile-name;
    service-mode maintenance;
  }
  global-profile {
    default-profile default-profile;
    home-profile home-profile;
    profile-selection-order [profile-selection-method];
    roamer-profile roamer-profile;
    visitor-profile visitor-profile;
  }
  gtpp {
    destination-port port-number;
    down-detect-time duration;
    echo-interval duration;
    header-type (long | short);
    n3-requests requests;
    no-path-management;
    pending-queue-size value;
    peer peer-name {
      destination-ipv4-address address;
      destination-port port-number;
      down-detect-time duration;
      echo-interval duration;
      header-type (long | short);
      n3-requests requests;
      no-path-management;
      pending-queue-size value;
      reconnect-time duration;
      source-interface interface-name [ipv4-address address];
      t3-response response-interval;
      transport-protocol (tcp | udp);
      version (v0 | v1 | v2);
    }
    reconnect-time duration;
    source-interface {
      interface-name;
      ipv4-address address;
    }
    t3-response response-interval;
    transport-protocol (tcp | udp);
    version (v0 | v1 | v2);
  }
  local-persistent-storage-options {
    cdrs-per-file value;
    disable-replication;
    disk-space-policy {
      watermark-level-1 {
        notification-level (both | snmp-alarm | syslog);
        percentage value;
      }
```

```
    watermark-level-2 {
      notification-level (both | snmp-alarm | syslog);
      percentage value;
    }
    watermark-level-3 {
      notification-level (both | snmp-alarm | syslog);
      percentage value;
    }
  }
  file-age {
    age;
    disable;
  }
  file-creation-policy (shared-file | unique-file);
  file-format (3gpp | raw-asn);
  file-name-private-extension string;
  file-size {
    size;
    disable;
  }
  traceoptions {
    file file-name <files number> <match regular-expression> <no-world-readable |
      world-readable> <size size>;
    flag flag;
    level (all | critical | error | info | notice | verbose | warning);
    no-remote-trace;
  }
  user-name string;
  world-readable;
}
traceoptions {
  file file-name <files number> <no-world-readable | world-readable> <size size>;
  flag flag;
  level (all | critical | error | info | notice | verbose | warning);
  no-remote-trace;
}
transport-profiles profile-name {
  description string;
  offline {
    charging-gateways {
      cdr-aggregation-limit value;
      cdr-release (r7 | r8 | r99);
      mtu value;
      peer-order {
        [peer charging-gateway-peer-name];
      }
      persistent-storage-order {
        local-storage;
      }
      switch-back-time seconds;
    }
  }
  service-mode maintenance;
}
trigger-profiles profile-name {
  description string;
```

```
    offline {
      container-limit value;
      exclude {
        ms-timezone-change;
        plmn-change;
        qos-change;
        rat-change;
        sgsn-mme-change;
        user-location-change;
      }
      sgsn-mme-change-limit value;
      time-limit value;
      volume-limit {
        value;
        direction (both | uplink);
      }
    }
    tariff-time-list {
      [tariff-time];
    }
  }
}
gtp {
  control {
    ddn-delay-sync (disable | enable);
    dscp-code-point value;
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    forwarding-classclass-name;
    interface {
      interface-name;
      v4-addressv4-address;
    }
    n3-requests requests;
    no-response-cache;
    path-management (disable | enable);
    response-cache-timeoutt interval-in-seconds;
    t3-response response-interval;
    ttl-value ttl-value;
  }
  data {
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    error-indication-interval seconds;
    indirect-tunnel (disable | enable);
    interface {
      interface-name;
      v4-addressv4-address;
    }
    num-gtpu-end-markers num-gtpu-end-markers;
    path-management (disable | enable);
  }
  echo-interval interval;
  echo-n3-requests requests;
```

```
echo-t3-response response-interval;
interface {
  interface-name;
  v4-addressv4-address;
}
n3-requests requests;
path-management (disable | enable);
peer-history number;
s11 {
  dscp-code-point value;
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  forwarding-classclass-name;
  interface {
    interface-name;
    v4-addressv4-address;
  }
  n3-requests requests;
  path-management (disable | enable);
  t3-response response-interval;
  ttl-value ttl-value;
}
s12 {
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  interface {
    interface-name;
    v4-addressv4-address;
  }
  path-management (disable | enable);
}
s1u {
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  interface {
    interface-name;
    v4-addressv4-address;
  }
  path-management (disable | enable);
}
s4 {
  control {
    dscp-code-point value;
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    forwarding-classclass-name;
    interface {
      interface-name;
      v4-addressv4-address;
    }
    n3-requests requests;
    path-management (disable | enable);
```

```
        t3-response response-interval;
        ttl-value ttl-value;
      }
      data {
        echo-interval interval;
        echo-n3-requests requests;
        echo-t3-response response-interval;
        interface {
          interface-name;
          v4-addressv4-address;
        }
        path-management (disable | enable);
      }
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      interface {
        interface-name;
        v4-addressv4-address;
      }
      n3-requests requests;
      path-management (disable | enable);
      t3-response response-interval;
    }
    s5 {
      control {
        dscp-code-point value;
        echo-interval interval;
        echo-n3-requests requests;
        echo-t3-response response-interval;
        forwarding-classclass-name;
        interface {
          interface-name;
          v4-addressv4-address;
        }
        n3-requests requests;
        path-management (disable | enable);
        t3-response response-interval;
        ttl-value ttl-value;
      }
      data {
        echo-interval interval;
        echo-n3-requests requests;
        echo-t3-response response-interval;
        interface {
          interface-name;
          v4-addressv4-address;
        }
        path-management (disable | enable);
      }
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      interface {
        interface-name;
        v4-addressv4-address;
```

```
    }
    n3-requests requests;
    path-management (disable | enable);
    t3-response response-interval;
  }
  s8 {
    control {
      dscp-code-point value;
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      forwarding-classclass-name;
      interface {
        interface-name;
        v4-addressv4-address;
      }
      n3-requests requests;
      path-management (disable | enable);
      t3-response response-interval;
      ttl-value ttl-value;
    }
    data {
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      interface {
        interface-name;
        v4-addressv4-address;
      }
      path-management (disable | enable);
    }
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    interface {
      interface-name;
      v4-addressv4-address;
    }
    n3-requests requests;
    path-management (disable | enable);
    t3-response response-interval;
  }
  t3-response response-interval;
  traceoptions {
    file filename {
      files files;
      (no-world-readable | world-readable);
      size size;
    }
    flag {
      flag;
    }
    level level;
    no-remote-trace;
  }
}
```

```
home-plmn {
  mcc [mcc] {
    mnc [mnc];
  }
}
idle-mode-buffering {
  disable;
  expire-timer time-in-seconds;
}
inline-services {
  ip-reassembly;
}
ip-reassembly-profile {
  profile-name;
}
local-policy-profile local-policy-profile;
maximum-bearers maximum-bearers;
preemption {
  enable;
}
remote-delete-on-peer-fail;
service-mode
software-datapath {
  traceoptions {
    file filename {
      files files;
      match match;
      size size;
      (no-world-readable | world-readable);
    }
    flag {
      flag;
    }
    level level;
    no-remote-trace;
  }
}
system {
  pfes {
    [interface interface-name];
  }
  session-pics {
    [interface interface-name];
  }
}
traceoptions {
  file filename {
    files files;
    match match;
    (no-world-readable | world-readable);
    size size;
  }
  flag {
    flag;
  }
  level level;
```

```
    no-remote-trace;
  }
}
```

Related Documentation
- [edit unified-edge gateways] Hierarchy Level on page 604
- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit unified-edge local-policies] Hierarchy Level

```
unified-edge {
  local-policies {
    policy-name {
      cos-policy-profile name;
      classifier-profile name;
      description description;
      dl-bandwidth-pool name;
      resource-threshold-profile name;
      roamer-classifier-profile name;
      roamer-cos-policy-profile name;
      ul-bandwidth-pool name;
      visitor-classifier-profile  name;
      visitor-cos-policy-profile name;
    }
  }
}
```

Related Documentation
- [edit unified-edge] Hierarchy Level on page 600
- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit unified-edge mobile-options] Hierarchy Level

```
unified-edge {
  mobile-options {
    traceoptions {
      file filename {
        files files;
        match match;
        (no-world-readable | world-readable);
        size size;
      }
      flag {
        flag;
      }
      no-remote-trace;
    }
  }
}
```

Related Documentation
- [edit unified-edge] Hierarchy Level on page 600
- Notational Conventions Used in Junos OS Configuration Hierarchies

## [edit unified-edge resource-management] Hierarchy Level

```
unified-edge {
  resource-management {
    client {
      traceoptions {
        file filename {
          files files;
          match match;
          (no-world-readable | world-readable);
          size size;
        }
        flag {
          flag;
        }
        no-remote-trace;
      }
    }
    server {
      traceoptions {
        file filename {
          files files;
          match match;
          (no-world-readable | world-readable);
          size size;
        }
        flag {
          flag;
        }
        no-remote-trace;
      }
    }
  }
}
```

**Related Documentation**

- [edit unified-edge] Hierarchy Level on page 600
- Notational Conventions Used in Junos OS Configuration Hierarchies

CHAPTER 18

# AAA on the Broadband Gateway

## aaa

**Syntax**

```
aaa {
    traceoptions {
    }
    mobile-profiles {
      map-name {
        radius {
          authentication {
            network-element name;
          }
          accounting {
            network-element name;
              network-element-group group-name;
              stop-on-failure;
              stop-on-access-deny;
            send-accounting-on;
            trigger {
              interim-interval minutes;
                no-cos-change;
                no-deferred-ipv4-address-update;
                no-ms-timezone-change;
                no-plmn-change;
                no-rat-change;
                no-sgw-change;
                no-user-location-information-change;
              }
          }
          options {
            nas-identifier-prefix identifier-value;
          }
          attributes {
            ignore {
              output-filter;
                framed-ip-netmask;
              input-filter;
            }
            exclude {
              accounting-authentic [accounting-start | accounting-interim | accounting-stop];
                accounting-delay-time [accounting-start | accounting-interim |
                  accounting-stop];
                accounting-terminate-cause [accounting-stop];
                all-3gpp [access-request | accounting-start | accounting-stop |
                  accounting-interim];
                called-station-id [access-request | accounting-start | accounting-interim |
                  accounting-stop];
                calling-station-id [access-request | accounting-start | accounting-interim |
                  accounting-stop];
                cg-address [access-request | accounting-start | accounting-stop |
                  accounting-interim];
                event-timestamp [accounting-start | accounting-interim | accounting-stop];
                imeisv [access-request | accounting-start];
                imsi [access-request | accounting-start | accounting-stop | accounting-interim];
```

```
                imsi-mcc-mnc [access-request | accounting-start | accounting-stop |
                  accounting-interim];
                input-filter [accounting-start | accounting-stop];
                input-gigapackets [accounting-interim | accounting-stop];
                input-gigawords [accounting-stop];
                nas-identifier [access-request | accounting-start | accounting-interim |
                  accounting-stop];
                nas-ip-address [access-request |
                  accounting-on|accounting-off|accounting-start | accounting-interim |
                  accounting-stop];
                nas-port [access-request | accounting-start | accounting-stop];
                nas-port-id [access-request | accounting-start | accounting-interim |
                  accounting-stop];
                nas-port-type [access-request];
                output-filter [accounting-start | accounting-stop];
                output-gigapackets [accounting-interim | accounting-stop];
                output-gigawords [accounting-stop];
                sgsn-mcc-mnc [access-request | accounting-start | accounting-interim |
                  accounting-stop];
              user-location-info [access-request | accounting-start | accounting-stop |
                accounting-interim];
            }
          }
        }
      }
    }
}
```

**Hierarchy Level** [edit unified-edge]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the authentication, authorization, and accounting (AAA) services provided using groups of external RADIUS servers. The Broadband Gateway supports a framework for providing AAA services to mobile subscribers.

**Options** The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156

## accounting

**Syntax**

```
accounting {
  network-element name;
    network-element-groupgroup-name;
    stop-on-failure;
    stop-on-access-deny;
  send-accounting-on;
  trigger {
    no-cos-change;
      no-deferred-ipv4-address-update;
      no-ms-timezone-change;
      no-plmn-change;
      no-rat-change;
      no-sgw-change;
      no-user-location-information-change;
    }
}
```

**Hierarchy Level** [edit unified-edge aaa mobile-profiles *map-name* radius]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify RADIUS accounting-related parameters. You can specify either the network element or the network element group to which the accounting requests are sent. In addition, the triggers that can initiate interim accounting records to be sent can be controlled.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- radius on page 646

## accounting-port

**Syntax** accounting-port *port-number*;

**Hierarchy Level** [edit access profile *profile-name* radius-server *server-address*],
[edit access radius-server *server-address*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the port number on which to contact the accounting server.

**Options** ***port-number***—Port number on which to contact the accounting server. Most RADIUS servers use port number 1813 (as specified in RFC 2866).

**Required Privilege Level** admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

**Related Documentation**
- Overview of AAA on the Broadband Gateway on page 156
- servers on page 650

## accounting-secret

**Syntax** accounting-secret *password*;

**Hierarchy Level** [edit access radius servers *server-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the **secret** password to be used when sending accounting requests to the RADIUS server. If the **secret** password is different from the authentication secret password, specify the **accounting secret** by using this option.

**Default** Use the same password used for authentication requests.

**Options** ***password***—Password for accounting requests.

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**
- Overview of AAA on the Broadband Gateway on page 156
- servers on page 650

## address

**Syntax** address *address*;

**Hierarchy Level** [edit access radius servers *server-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the IPv4 address of the RADIUS server to which the authentication and accounting requests are sent.

**Options** ***address***—IPv4 address of the RADIUS server.

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**
- Overview of AAA on the Broadband Gateway on page 156
- servers on page 650

## algorithm

**Syntax** algorithm *(direct | round-robin)*;

**Hierarchy Level** [edit access radius network-elements *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify an algorithm to decide which RADIUS server is used for the next request.

**Options** ***direct***—Default method in which there is no load balancing. The gateway always uses the highest-priority server to send requests. The other servers are used as backup.

***round-robin***—This method provides for load balancing in which the gateway sends requests to different high-priority servers in a rotating fashion. Lower-priority servers are used as backup.

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**
- Overview of AAA on the Broadband Gateway on page 156
- network-elements on page 642

## allow-dynamic-requests

**Syntax** allow-dynamic-requests;

**Hierarchy Level** [edit access radius servers *server-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify this option to receive dynamic requests from the RADIUS server.

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- servers on page 650

## attributes

**Syntax**

```
attributes {
  ignore {
    output-filter;
      framed-ip-netmask;
    input-filter;
  }
  exclude {
    accounting-authentic [accounting-start | accounting-interim | accounting-stop];
      accounting-delay-time [accounting-start | accounting-interim | accounting-stop];
      accounting-terminate-cause [accounting-stop];
      all-3gpp [access-request | accounting-start | accounting-stop | accounting-interim];
      called-station-id [access-request | accounting-start | accounting-interim |
        accounting-stop];
      calling-station-id [access-request | accounting-start | accounting-interim |
        accounting-stop];
      cg-address [access-request | accounting-start | accounting-stop | accounting-interim];
      event-timestamp [accounting-start | accounting-interim | accounting-stop];
      imeisv [access-request | accounting-start];
      imsi [access-request | accounting-start | accounting-stop | accounting-interim];
      imsi-mcc-mnc [access-request | accounting-start | accounting-stop |
        accounting-interim];
      input-filter [accounting-start | accounting-stop];
      input-gigapackets [accounting-interim | accounting-stop];
      input-gigawords [accounting-stop];
      nas-identifier [access-request | accounting-start | accounting-interim |
        accounting-stop];
      nas-ip-address [access-request | accounting-on|accounting-off|accounting-start |
        accounting-interim | accounting-stop];
      nas-port [access-request | accounting-start | accounting-stop];
      nas-port-id [access-request | accounting-start | accounting-interim | accounting-stop];
      nas-port-type [access-request];
      output-filter [accounting-start | accounting-stop];
      output-gigapackets [accounting-interim | accounting-stop];
      output-gigawords [accounting-stop];
      sgsn-mcc-mnc [access-request | accounting-start | accounting-interim |
        accounting-stop];
    user-location-info [access-request | accounting-start | accounting-stop |
      accounting-interim];
  }
}
```

**Hierarchy Level** [edit unified-edge aaa mobile-profiles *map-name* radius]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the RADIUS attributes to be ignored by the broadband gateway in Access-Accept messages that the AAA profile receives. You can also specify which RADIUS attributes must be excluded by the gateway from specific types of RADIUS messages that the AAA profile generates.

The remaining statements are explained separately.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Overview of AAA on the Broadband Gateway on page 156
- radius on page 646

## authentication

**Syntax**
```
authentication {
  network-element name;
}
```

**Hierarchy Level**
[edit unified-edge aaa mobile-profiles *map-name* radius]

**Release Information**
Statement introduced in Junos OS Mobility Release 11.2W.

**Description**
Specify the network element to be used for authentication. If the network element is not specified, authentication requests for the access point name (APN) pointing to that profile is not be triggered.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Overview of AAA on the Broadband Gateway on page 156
- radius on page 646

## authentication-port

**Syntax**
authentication-port *port-number*;

**Hierarchy Level**
[edit access radius servers *server-name*]

**Release Information**
Statement introduced in Junos OS Mobility Release 11.2W.

**Description**
Specify the port number to which the RADIUS authentication requests are sent.

**Default**
The default port number is 1812.

**Options**
***port-number***—Port number to which the RADIUS authentication requests are sent.

**Required Privilege Level**
access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**
- Overview of AAA on the Broadband Gateway on page 156
- servers on page 650

## dead-criteria-retries

**Syntax** dead-criteria retries *retry-number* interval *seconds*;

**Hierarchy Level** [edit access radius servers *server-name*]

**Release Information** Statement introduced in Junos OS Release 11.2.

**Description** Specify the criteria used to mark a RADIUS server dead. If the number of retries exceeds the *retry-number* within an interval of *seconds*, then the RADIUS server is marked dead.

**Default** If this attribute value is not specified, then the dead server detection option is disabled.

**Options** ***retry-number***—Number of retries with set values.

***seconds***—Time interval in seconds.

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**
- Overview of AAA on the Broadband Gateway on page 156
- servers on page 650

## dynamic-requests-secret

**Syntax** dynamic-requests-secret *password*;

**Hierarchy Level** [edit access radius servers *server-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the secret password used for dynamic requests. The secret password has to be specified to receive dynamic requests from the RADIUS server.

**Default** Use the same password that is used for authentication requests.

**Options** ***password***—Password for dynamic requests.

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**
- Overview of AAA on the Broadband Gateway on page 156
- servers on page 650

## exclude (RADIUS)

**Syntax**

```
exclude {
  accounting-authentic [accounting-start | accounting-interim | accounting-stop];
  accounting-delay-time [accounting-start | accounting-interim | accounting-stop];
  accounting-terminate-cause [accounting-stop];
  all-3gpp [access-request | accounting-start | accounting-stop | accounting-interim];
  called-station-id [access-request | accounting-start | accounting-interim | accounting-stop];
  calling-station-id [access-request | accounting-start | accounting-interim |
    accounting-stop];
  charging-id [access-request | accounting-interim | accounting-start | accounting-stop];
  event-timestamp [accounting-start | accounting-interim | accounting-stop];
  ggsn-address [access-request | accounting-interim | accounting-start | accounting-stop];
  gprs-negotiated-qos [access-request | accounting-interim | accounting-start |
    accounting-stop];
  imeisv [access-request | accounting-start];
  imsi [access-request | accounting-start | accounting-stop | accounting-interim];
  imsi-mcc-mnc [access-request | accounting-start | accounting-stop | accounting-interim];
  input-gigapackets [accounting-interim | accounting-stop];
  input-gigawords [accounting-interim | accounting-stop];
  input-packets [accounting-interim | accounting-stop];
  nas-identifier [access-request | accounting-interim | accounting-start |accounting-stop];
  nas-ip-address [access-request | accounting-on |accounting-off | accounting-start |
    accounting-interim | accounting-stop];
  nas-port-type [access-request | accounting-interim | accounting-start | accounting-stop];
  nsapi [access-request | accounting-interim | accounting-start | accounting-stop];
  output-gigapackets [accounting-interim | accounting-stop];
  output-gigawords [accounting-interim | accounting-stop];
  output-packets [accounting-interim | accounting-stop];
  selection-mode [access-request | accounting-interim | accounting-start | accounting-stop];
  sgsn-mcc-mnc [access-request | accounting-start | accounting-interim | accounting-stop];
  user-location-info [access-request | accounting-start | accounting-stop |
    accounting-interim];
}
```

**Hierarchy Level** [edit unified-edge aaa mobile-profiles *map-name* radius attributes]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support for the **charging-id**, **ggsn-address**, **gprs-negotiated-qos**, **nsapi**, and **selection-mode** attributes introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the gateway to exclude the specified attributes from the specified type of RADIUS message.

Not all attributes are available in all types of RADIUS messages. By default, the gateway includes the specified attributes in RADIUS Access-Request, Acct-On, Acct-Off, Acct-Start, and Acct-Stop messages.

**Options** RADIUS attribute type—RADIUS attribute or Juniper Networks VSA number and name.

- **accounting-authentic**—Exclude the RADIUS attribute 45, Acct-Authentic.
- **accounting-delay-time**—Exclude the RADIUS attribute 41, Acct-Delay-Time.

- **accounting-terminate-cause**—Exclude the RADIUS attribute 49, Acct-Terminate-Cause.
- **all-3gpp**—Exclude all 3GPP attributes.
- **called-station-id**—Exclude the RADIUS attribute 30, Called-Station-ID.
- **calling-station-id**—Exclude the RADIUS attribute 31, Calling-Station-ID.
- **charging-id**—Exclude the RADIUS attribute 3GPP VSA 26-2, 3GPP-CHARGING-ID.
- **event-timestamp**—Exclude the RADIUS attribute 55, Event-Timestamp.
- **ggsn-address**—Exclude the RADIUS attribute 3GPP VSA 26-7, 3GPP-GGSN-ADDRESS.
- **gprs-negotiated-qos**—Exclude the RADIUS attribute 3GPP VSA 26-5, 3GPP-GPRS-NEG-QOS.
- **imeisv**—Exclude the 3GPP-IMEISV attribute from the access-request or accounting-start request sent to the RADIUS server.
- **imsi**—Exclude the 3GPP-IMSI attribute from the requests sent to the RADIUS server.
- **imsi-mcc-mnc**—Exclude the RADIUS attribute 3GPP VSA 26-8, 3GPP-IMSI-MCC-MNC.
- **input-gigapackets**—Exclude the RADIUS attribute 26-42, Acct-Input-Gigapackets.
- **input-gigawords**—Exclude the RADIUS attribute 52, Acct-Input-Gigawords.
- **input-packets**—Exclude the RADIUS attribute 47, Acct-Input-Packets.
- **nas-identifier**—Exclude the RADIUS attribute 32, NAS-identifier.
- **nas-ip-address**—Exclude the RADIUS attribute, NAS-IP-address.
- **nas-port-type**—Exclude the RADIUS attribute 61, NAS-Port-Type.
- **nsapi**—Exclude the RADIUS attribute 3GPP VSA 26-10, 3GPP-NSAPIe.
- **output-gigapackets**—Exclude the RADIUS attribute 26-43, Acct-Output-Gigapackets.
- **output-gigawords**—Exclude the RADIUS attribute 53, Acct-Output-Gigawords.
- **output-packets**—Exclude the RADIUS attribute 48, Acct-Output-Packets.
- **selection-mode**—Exclude the RADIUS attribute 3GPP VSA 26-12, 3GPP-SELECTION-MODE.
- **sgsn-mcc-mnc**—Exclude the SGSN-MCC-MNC attribute from the requests sent to the RADIUS server.
- **user-location-info**—Exclude the RADIUS attribute 3GPP VSA 26-22, 3GPP-USER-LOCATION-INFO.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- attributes on page 632

## ignore

**Syntax**

```
ignore {
  output-filter;
  framed-ip-netmask;
  input-filter;
}
```

**Hierarchy Level** [edit unified-edge aaa mobile-profiles *map-name* radius attributes]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure so that the specified attribute in RADIUS Access-Accept messages is ignored.

**Options**

***output-filter***— Ignore this attribute in the Access-Accept message.

***framed-ip-netmask***—Ignore this attribute in the Access-Accept message.

***input-filter***—Ignore this attribute in the Access-Accept message.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- attributes on page 632

## maximum-pending-reqs-limit

**Syntax** maximum-pending-reqs-limit *number*;

**Hierarchy Level** [edit access radius network-elements *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the maximum number of requests that can be queued to the network element. When the pending request queue is full, any additional requests are dropped. If the number of pending requests reaches 80 percent of the maximum, a **flow control on** message is generated. When the number of pending requests subsequently drops to 60 percent of the maximum, a **flow control off** message is generated.

**Options** ***number***—Maximum number of pending requests.

**Required Privilege Level**
access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- network-elements on page 642

## mobile-profiles

**Syntax**

```
mobile-profiles {
  map-name {
    radius {
      authentication {
        network-element name;
      }
      accounting {
        network-element name;
          network-element-group group-name;
          stop-on-failure;
          stop-on-access-deny;
        send-accounting-on;
        trigger {
          no-rat-change;
            no-sgw-change;
            no-cos-change;
            interim-interval minutes;
            no-plmn-change;
            no-user-location-information-change;
            no-ms-timezone-change;
            no-deferred-ipv4-address-update;
          }
      }
      options {
        nas-identifier-prefix identifier-value;
      }
      attributes {
        ignore {
          output-filter;
            framed-ip-netmask;
          input-filter;
        }
        exclude {
          accounting-authentic [accounting-start | accounting-interim | accounting-stop];
            accounting-delay-time [accounting-start | accounting-interim | accounting-stop];
            accounting-terminate-cause [accounting-stop];
            all-3gpp [access-request | accounting-start | accounting-stop |
              accounting-interim];
            called-station-id [access-request | accounting-start | accounting-interim |
              accounting-stop];
            calling-station-id [access-request | accounting-start | accounting-interim |
              accounting-stop];
            cg-address [access-request | accounting-start | accounting-stop |
              accounting-interim];
            event-timestamp [accounting-start | accounting-interim | accounting-stop];
            imeisv [access-request | accounting-start];
            imsi [access-request | accounting-start | accounting-stop | accounting-interim];
            imsi-mcc-mnc [access-request | accounting-start | accounting-stop |
              accounting-interim];
            input-filter [accounting-start | accounting-stop];
            input-gigapackets [accounting-interim | accounting-stop];
            input-gigawords [accounting-stop];
```

```
            nas-identifier [access-request | accounting-start | accounting-interim |
              accounting-stop];
            nas-ip-address [access-request | accounting-on|accounting-off|accounting-start
              | accounting-interim | accounting-stop];
            nas-port [access-request | accounting-start | accounting-stop];
            nas-port-id [access-request | accounting-start | accounting-interim |
              accounting-stop];
            nas-port-type [access-request];
            output-filter [accounting-start | accounting-stop];
            output-gigapackets [accounting-interim | accounting-stop];
            output-gigawords [accounting-stop];
            sgsn-mcc-mnc [access-request | accounting-start | accounting-interim |
              accounting-stop];
          user-location-info [access-request | accounting-start | accounting-stop |
            accounting-interim];
        }
      }
    }
  }
}
```

**Hierarchy Level** [edit unified-edge aaa]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the sections under mobile-profiles that control the access and accounting request information sent to the RADIUS server. It also contains sections to specify the network element or network element group to which the request must be sent.

**Options** The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- aaa on page 626

## network-element

**Syntax** network-element *name*;

**Hierarchy Level** [edit unified-edge aaa mobile-profiles *map-name* radius accounting]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the network element to be used for accounting. If the accounting network element is not specified, accounting requests for the access point name pointing to that profile is not be triggered.

**Options** ***name***—Name of the network element.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Overview of AAA on the Broadband Gateway on page 156
- accounting on page 628

## network-element-group

**Syntax** network-element-group *group-name*;

**Hierarchy Level** [edit unified-edge aaa mobile-profiles *map-name* radius accounting]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the network element group used for accounting. The network element group allows to send the same accounting record to multiple RADIUS network elements. You can specify either a network element or a network element group for accounting.

**Options** ***group-name***—Name of the network element group.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Overview of AAA on the Broadband Gateway on page 156
- accounting on page 628

## network-element-groups

**Syntax**

```
network-element-groups name {
    network-element name {
      mandatory;
      }
      broadcast;
    }
  }
```

**Hierarchy Level** [edit access radius]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure a group of network elements. A network element group can have a maximum of four network elements. You can optionally configure the broadcast attribute in a network element. However, if broadcast is configured, then there should be a minimum of one network element that is flagged as mandatory. Network element-groups are used for accounting records and is used only for accounting in the AAA profile.

**Options**

***mandatory***—Indicates that a response is mandatory from a specified network element before any services can be provided to the subscriber.

***broadcast***—Broadcasts the accounting messages to all of the network elements in the group. If you configure the broadcast parameter, you should specify the mandatory parameter for at least one of the network elements in the group.

***name***—Name of the network element group.

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- radius on page 644

## network-elements

**Syntax**

```
network-elements name {
        server name {
          priority priority;
        }
      algorithm ( direct | round-robin);
        maximum-pending-reqs-limit number;
      }
  }
```

**Hierarchy Level** [edit access radius]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify a network element that is a load-balanced group of RADIUS servers providing authentication, authorization, and accounting services for mobile subscribers accessing an APN. The RADIUS servers have two priorities: 1 or 2. You can have multiple servers with the same priority in a network element. All requests are sent to the highest priority server in the network element based on the algorithm (direct or round-robin).

**Options** ***name***—Name of the network element.

***priority***—Relative priority for the first server.

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- radius on page 644

## options

**Syntax**

```
options {
  nas-identifier-prefix identifier-value
    nas-ip-address gw-address;
  nas-port-type type;
}
```

**Hierarchy Level** [edit unified-edge aaa mobile-profiles *map-name* radius]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the attributes that are included as part of different request messages sent to the RADIUS server.

**Options**

**nas-identifier-prefix *identifier-value***—Specify the prefix that is used in the NAS identifier attribute. Each services PIC appends a unique suffix and that appended value will be used as the NAS identifier in the RADIUS requests.

**nas-ip-address *gw-address***—The IP address to be used for the NAS IP address attribute when sending the requests to the RADIUS server.

**nas-port-type *type***—The NAS port type (wireless or virtual) that is used in RADIUS requests.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- radius on page 646

## radius (Access)

**Syntax**

```
radius {
  traceoptions {
    file radius;
      flag send-detail;
      flag recv-detail;
      level all;
      server {
        server name;
      }
    }
  servers server-name {
      address address;
        source-interface interface {
          ipv4-address address;
        }
        accounting-port port-number;
        accounting-secret password;
        allow-dynamic-requests ;
        authentication-port port-number;
        dead-criteria retries retry-number interval seconds;
        dynamic-requests-secret password;
        retry attempts;
        revert-interval time;
        secret password;
        timeout seconds;
      }
    }
  network-elements name {
        server name {
          priority priority ;
        }
      algorithm ( direct | round-robin);
        maximum-pending-reqs-limit number ;
      }
    }
  network-element-groups name {
      network-element name {
        mandatory;
        }
        broadcast;
      }
    }
}
```

**Hierarchy Level** [edit access]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify multiple RADIUS servers with their attributes. The RADIUS servers are distinguished by unique names. You can also group a set of RADIUS servers into a network element. A network element is a load-balanced group of RADIUS servers that provides authentication, authorization, and accounting services for mobile subscribers accessing

an access point name. Additionally, you can group a set of network elements into a network element-group.

**Options**

***name***—Name of the server.

The remaining statements are explained separately.

**Required Privilege Level**

access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156

## radius

**Syntax**

```
radius {
  authentication {
    network-element name;
  }
  accounting{
    network-element name;
      network-element-groupgroup-name;
      stop-on-failure;
      stop-on-access-deny;
    send-accounting-on;
    trigger {
      no-rat-change;
        no-sgw-change;
        no-cos-change;
        interim-interval minutes;
        no-plmn-change;
        no-user-location-information-change;
        no-ms-timezone-change;
        no-deferred-ipv4-address-update;
      }
  }
  options {
    nas-identifier-prefix identifier-value;
  }
  attributes {
    ignore {
      output-filter;
        framed-ip-netmask;
      input-filter;
    }
    exclude {
      accounting-authentic [accounting-start | accounting-interim | accounting-stop];
        accounting-delay-time [accounting-start | accounting-interim | accounting-stop];
        accounting-terminate-cause [accounting-stop];
        all-3gpp [access-request | accounting-start | accounting-stop | accounting-interim];
        called-station-id [access-request | accounting-start | accounting-interim |
          accounting-stop];
        calling-station-id [access-request | accounting-start | accounting-interim |
          accounting-stop];
        cg-address [access-request | accounting-start | accounting-stop |
          accounting-interim];
        event-timestamp [accounting-start | accounting-interim | accounting-stop];
        imeisv [access-request | accounting-start];
        imsi [access-request | accounting-start | accounting-stop | accounting-interim];
        imsi-mcc-mnc [access-request | accounting-start | accounting-stop |
          accounting-interim];
        input-filter [accounting-start | accounting-stop];
        input-gigapackets [accounting-interim | accounting-stop];
        input-gigawords [accounting-stop];
        nas-identifier [access-request | accounting-start | accounting-interim |
          accounting-stop];
```

```
            nas-ip-address [access-request | accounting-on|accounting-off|accounting-start |
              accounting-interim | accounting-stop];
            nas-port [access-request | accounting-start | accounting-stop];
            nas-port-id [access-request | accounting-start | accounting-interim |
              accounting-stop];
            nas-port-type [access-request];
            output-filter [accounting-start | accounting-stop];
            output-gigapackets [accounting-interim | accounting-stop];
            output-gigawords [accounting-stop];
            sgsn-mcc-mnc [access-request | accounting-start | accounting-interim |
              accounting-stop];
          user-location-info [access-request | accounting-start | accounting-stop |
            accounting-interim];
        }
      }
    }
```

**Hierarchy Level** [edit unified-edge]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify multiple RADIUS servers with their attributes. The RADIUS servers are distinguished with unique names.

**Options** The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- aaa on page 626

## retry

**Syntax** retry *attempts*;

**Hierarchy Level** [edit access radius servers *server-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the number of attempts that the gateway is allowed to contact a RADIUS authentication or accounting server when it does not receive a response to its initial request.

**Options** ***attempts***—Number of attempts that the gateway is allowed to contact a RADIUS server.
**Range:** 1 through 10
**Default:** 3

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**
- Overview of AAA on the Broadband Gateway on page 156
- servers on page 650

## revert-interval

**Syntax** revert-interval *time*;

**Hierarchy Level** [edit access radius servers *server-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the amount of time the gateway waits after a server has become unreachable. After the configured time, the server is marked active and is used to send requests in accordance with its order and priority in the network element.

**Options** *time*—Duration after which a dead server is marked active.
**Default:** 300 seconds

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**
- Overview of AAA on the Broadband Gateway on page 156
- servers on page 650

## secret

**Syntax** secret *password*;

**Hierarchy Level** [edit access radius servers *server-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify a default password to be used for authentication or accounting. This is a mandatory statement.

**Options** ***password***—Password to use.

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**
- Overview of AAA on the Broadband Gateway on page 156

## send-accounting-on

**Syntax** send-accounting-on;

**Hierarchy Level** [edit unified-edge aaa mobile-profiles *map-name* radius accounting]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure different services PICs to send the accounting on the RADIUS message to the accounting network element on initialization. If this attribute is not configured, the accounting on the message is not sent by default.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Overview of AAA on the Broadband Gateway on page 156
- accounting on page 628

## servers

**Syntax**

```
servers server-name {
    address address;
      source-interface interface {
        ipv4-address address;
      }
      accounting-port port-number;
      accounting-secret password;
      allow-dynamic-requests ;
      authentication-port port-number;
      dead-criteria retries retry-number interval seconds;
      dynamic-requests-secret password;
      retry attempts;
      revert-interval time;
      secret password;
      timeout seconds;
    }
  }
```

**Hierarchy Level** [edit access radius]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the RADIUS servers to which RADIUS authentication and accounting requests are sent when user equipment sessions are established.

**Options** *server-name*—Name of the server.

The remaining statements are explained separately.

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- radius on page 644

## source-interface

**Syntax** source-interface *interface* [ipv4-address *address*];

**Hierarchy Level** [edit access radius servers *server-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the source interface on the gateway from which the RADIUS requests are sent to the RADIUS server. This is a mandatory statement.

**Options** ***interface***—Source interface that sends the RADIUS packets.

***address***—IPv4 address of the RADIUS server.

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- servers on page 650

## stop-on-access-deny

**Syntax** stop-on-access-deny;

**Hierarchy Level** [edit unified-edge aaa mobile-profiles *map-name* radius accounting]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the gateway to send an accounting stop message when authentication fails for a user.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- accounting on page 628

## stop-on-failure

**Syntax** stop-on-failure;

**Hierarchy Level** [edit unified-edge aaa mobile-profiles *map-name* radius accounting]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the gateway to send an accounting stop message when the gateway fails to bring up the user equipment session.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Overview of AAA on the Broadband Gateway on page 156
- accounting on page 628

## timeout

**Syntax** timeout *seconds*;

**Hierarchy Level** [edit access radius servers *server-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the amount of time that the gateway waits to receive a response from a RADIUS server before retrying the request.

**Options** *seconds*—Amount of time to wait.
**Range:** 1 through 90 seconds
**Default:** 3 seconds

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**
- Overview of AAA on the Broadband Gateway on page 156
- servers on page 650

## traceoptions

**Syntax**

```
traceoptions {
  file radius;
    flag send-detail;
    flag recv-detail;
    flag timeout;
    flag state;
    level all;
    server {
      server name;
    }
  }
```

**Hierarchy Level** [edit access radius]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Trace options related to RADIUS servers.

**Options**

**file radius**— Name of the file to receive the output of the tracing operation. The packets that are transmitted to and received from the RADIUS server are logged to the specified filename.

**flag send-detail**—All the attributes that are included in the RADIUS requests are logged to the specified file.

**flag recv-detail**—All the attributes that are included in the RADIUS response are logged to the file.

**flag timeout**—Set this flag to log events related to response timeouts.

**flag state**—Set this flag to trace the RADIUS server state changes.

**level all**—Various levels of information that can be logged, for example—debug, info, warning, and critical.

**server**—Server to be traced.

**Required Privilege Level**
access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- radius on page 644

## traceoptions

**Syntax**

```
traceoptions {
  file filename;
  level all;
  flag ( init | config | general | request | response | high-availability | all);
}
```

**Hierarchy Level** [edit unified-edge aaa]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Define tracing operations for the AAA configuration.

**Options**

**file *filename*** — Name of the file to receive the output of the tracing operation. The packets that are transmitted to and received from the RADIUS server are logged to the specified filename.

**level all**—Various levels of information that can be logged, for example, debug, info, warning, and critical.

**flag init**—Trace initialization-related events.

**flag config**—Trace config-related events.

**flag general**—Trace general events.

**flag request**—Trace request-related events.

**flag response**—Trace response-related events.

**flag high-availability**—Trace high-availability-related events.

**flag all**—Trace all the flag-related events.

**Required Privilege Level**

trace and unified-edge—To view this statement in the configuration.
trace-control and unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- aaa on page 626

## trigger

**Syntax**

```
trigger {
  no-cos-change;
    no-deferred-ipv4-address-update;
    no-ms-timezone-change;
    no-plmn-change;
    no-rat-change;
    no-sgw-change;
  no-user-location-information-change;
}
```

**Hierarchy Level** [edit unified-edge aaa mobile-profiles *map-name* radius accounting]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the conditions under which the interim accounting records are sent to the accounting servers. By default, the broadband gateway sends the interim accounting records when various trigger conditions are met.

If you want to suppress the gateway from sending the interim accounting records for certain trigger conditions, such trigger condition can be specified in the **trigger** statement. If you want to have the gateway send periodic interim accounting records, configure **interim-interval** statement. By default, all these triggers are enabled. To skip generating the interim accounting record, configure the appropriate statement. To generate periodic interim updates, you must configure **interim-interval** statement.

**Options**

**interim-interval *minutes***—Set the gateway not to send the interim updates at the specified interval. If you do not set this option, periodic sent updates are not sent.

**no-cos-change**—Set the gateway not to send the accounting-interim update on a CoS change. If you do not set this option, the accounting-interim update is sent on a CoS change.

**no-deferred-ipv4-address-update**—Set the gateway not to send the accounting-interim update on a deferred IPv4 address update. If you do not set this option, the accounting-interim update is sent on a deferred IPv4 address update.

**no-ms-timezone-change**—Set the gateway not to send the accounting-interim update on an MS-Timezone change. If you do not set this option, the accounting-interim update is sent on an MS-Timezone change.

**no-plmn-change**—Set the gateway not to send the accounting-interim update on a PLMN change. If you do not set this option, the accounting-interim update is sent on a PLMN change.

**no-rat-change**—Set the gateway not to send the accounting-interim update on a RAT change. If you do not set this option, the accounting-interim update is sent on a RAT change.

**no-sgw-change**—Set the gateway not to send the accounting-interim update on an S-GW change. If you do not set this option, the accounting-interim update is sent on an S-GW change.

**no-user-location-information-change**—Set the gateway not to send the accounting-interim update on a User Location Information change. If you do not set this option, the accounting-interim update is sent on a User Location Information change

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Overview of AAA on the Broadband Gateway on page 156
- accounting on page 628

CHAPTER 19

# Address Assignment and DHCP Configuration Statements

## Address Assignment Configuration Statements

## address-assignment (MobileNext Broadband Gateway)

**Syntax**

```
address-assignment {
  mobile-pool-groups {
    group-name {
      [pool-name];
    }
  }
  mobile-pools {
    name {
      ageing-window ageing-window;
      default-pool;
      family (inet | inet6) {
        network {
          [network-prefix] {
            allocation-prefix-length allocation-prefix-length;
            external-assigned;
            range {
              [name] {
                external-assigned;
                high high;
                low low;
              }
            }
          }
        }
      }
      pool-prefetch-threshold  pool-prefetch-threshold;
      pool-snmp-trap-threshold pool-snmp-trap-threshold;
      service-mode service-mode-options;
    }
  }
}
```

**Hierarchy Level**

[edit access],
[edit routing-instances *instance-name* access]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.

**Description**

Configure the mobile pools and mobile pool groups that are used by the broadband gateway to assign addresses to subscribers. You can configure both IPv4 and IPv6 mobile pools and mobile pool groups.

The remaining statements are explained separately.

**Required Privilege Level**

access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- [edit access address-assignment] Hierarchy Level on page 594
- Example: Simple Unified Edge Configuration on page 511

## ageing-window (Mobile Pools)

**Syntax** ageing-window *ageing-window*;

**Hierarchy Level** [edit access address-assignment mobile-pools *name*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the time up to which IP addresses from the configured mobile pools should not be reused. Addresses from deleted packet data protocol (PDP) contexts or bearers are not reused by the broadband gateway until the time specified.

**Default** If you do not configure a value, then the default is used.

**Options** ***ageing-window***—Time, in seconds, up to which addresses should not be reused.

**Range:** 1 through 65,535 seconds

**Default:** 2 seconds

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- mobile-pools on page 665

## allocation-prefix-length (Mobile Pools)

**Syntax** allocation-prefix-length *allocation-prefix-length*;

**Hierarchy Level** [edit access address-assignment mobile-pools *name* family inet network *network-prefix*],
[edit access address-assignment mobile-pools *name* family inet6 network *network-prefix*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet network *network-prefix*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet6 network *network-prefix*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the prefix length for address allocation in mobile pools. The allocation prefix length determines the size of the address allocation block (or chunk) assigned to each session PIC on the broadband gateway.

The default configuration for mobile pools is to assign 1024 addresses (prefix length 22 for IPv4 and 54 for IPv6) in each address allocation block. When the mobile pools are relatively small, the default configuration may not allow for all session PICs to be assigned an address block from which to allocate IP addresses. The prefix length specified using the **allocation-prefix-length** statement overrides the default prefix length. If the configured prefix length is smaller than the default prefix length, then this increases the chances that all session PICs are allocated an address block.

NOTE:

- If you configure this statement, then you cannot configure the external-assigned statement.
- The allocation prefix length cannot be less than the corresponding network prefix length. For example, if the network prefix length is 24 (for IPv4), the allocation prefix length cannot be 23 or 22.

**Options** ***allocation-prefix-length***—Prefix length for the address allocation.

**Range:**

- 32 (1 address) to 22 (1024 addresses) for IPv4 addresses
- 64 (1 address) to 54 (1024 addresses) for IPv6 addresses

**Default:**

- 22 (1024 addresses) for IPv4 addresses
- 54 (1024 addresses) for IPv6 addresses

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**
- network (Mobile Pools) on page 666

## default-pool (Mobile Pools)

**Syntax** default-pool;

**Hierarchy Level** [edit access address-assignment mobile-pools *name*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the mobile pool as a default pool. The broadband gateway uses the default pool to assign IP addresses to subscribers when a mobile pool or mobile pool group is not explicitly specified in the address assignment configuration for the access point name (APN).

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**
- address-assignment (APN) on page 724
- mobile-pools on page 665

## external-assigned (Mobile Pools)

**Syntax** external-assigned;

**Hierarchy Level**
[edit access address-assignment mobile-pools *name* family inet network *network-prefix*],
[edit access address-assignment mobile-pools *name* family inet6 network *network-prefix*],
[edit access address-assignment mobile-pools *name* family inet network *network-prefix* range *name*],
[edit access address-assignment mobile-pools *name* family inet6 network *network-prefix* range *name*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet network *network-prefix*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet6 network *network-prefix*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet network *network-prefix* range *name*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet6 network *network-prefix* range *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify that the addresses in the associated network prefix or range are assigned by an external authority—for example, by the authentication, authorization, and accounting (AAA) server or statically by the user equipment. You can specify this either for the network prefix or for a range under the network prefix.

NOTE: If you configure this statement, then you cannot configure the allocation-prefix-length statement.

**Required Privilege Level**
access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**
- network (Mobile Pools) on page 666
- range (Mobile Pools) on page 669

## family (Mobile Pools)

**Syntax**

```
family (inet | inet6) {
  network {
    [network-prefix] {
      allocation-prefix-length allocation-prefix-length;
      external-assigned;
      range {
        [name] {
          external-assigned;
          high high;
          low low;
        }
      }
    }
  }
}
```

**Hierarchy Level** [edit access address-assignment mobile-pools *name*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the protocol family information for the mobile pool. Mobile pools must have either **inet** (IPv4) or **inet6** (IPv6) configured.

NOTE: A mobile pool can have either inet (IPv4) or inet6 (IPv6) configured but not both.

**Options** **inet**—IP version 4 (IPv4).

**inet6**—IP version 6 (IPv6).

The remaining statements are explained separately.

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- mobile-pools on page 665

## mobile-pool-groups

**Syntax**

```
mobile-pool-groups {
  group-name {
    [pool-name];
  }
}
```

**Hierarchy Level** [edit access address-assignment],
[edit routing-instances *instance-name* access address-assignment]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the mobile pool groups that are used by the broadband gateway to assign addresses to subscribers. You can configure both IPv4 and IPv6 pool groups.

Mobile pool groups are a collection of one or more mobile pools. All the mobile pools in a mobile pool group should be of the same protocol family—**inet** or **inet6**. In addition, none of the mobile pools in a mobile pool group should be marked as a default.

**Options** ***group-name***—Name of the mobile pool group.

**Range:** Up to 63 characters

***pool-name***—Name of the mobile pool. To specify multiple mobile pools, include the ***pool-name*** statement multiple times.

**Range:** Up to 63 characters

NOTE: The mobile pool that you specify must be previously configured on the broadband gateway in the same routing instance as the mobile pool group.

The remaining statements are explained separately.

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- address-assignment (MobileNext Broadband Gateway) on page 658
- mobile-pools on page 665

## mobile-pools

**Syntax**

```
mobile-pools {
  name {
    ageing-window ageing-window;
    default-pool;
    family (inet | inet6) {
      network {
        allocation-prefix-length allocation-prefix-length;
        [network-prefix] {
          external-assigned;
          range {
            [name] {
              external-assigned;
              high high;
              low low;
            }
          }
        }
      }
    }
    pool-prefetch-threshold  pool-prefetch-threshold;
    pool-snmp-trap-threshold pool-snmp-trap-threshold;
    service-mode service-mode-options;
  }
}
```

**Hierarchy Level** [edit access address-assignment],
[edit routing-instances *instance-name* access address-assignment]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the mobile pools that are used by the broadband gateway to assign addresses to subscribers. You can configure both IPv4 and IPv6 mobile pools and various other parameters related to address assignment.

**Options** *name*—Name of the mobile pool.

**Range:** Up to 63 characters

The remaining statements are explained separately.

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- address-assignment (MobileNext Broadband Gateway) on page 658

## network (Mobile Pools)

**Syntax**

```
network {
  [network-prefix] {
    allocation-prefix-length allocation-prefix-length;
    external-assigned;
    range {
      [name] {
        external-assigned;
        high high;
        low low;
      }
    }
  }
}
```

**Hierarchy Level**

[edit access address-assignment mobile-pools *name* family inet],
[edit access address-assignment mobile-pools *name* family inet6],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet6]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.

**Description**

Specify the network prefix for the mobile pool for IPv4 or IPv6 addresses. The broadband gateway uses the network prefix to assign IP addresses to mobile subscribers. In addition, if an address range is configured under the network prefix, then addresses are allocated only from the specified range.

NOTE: At least one network prefix must be configured.

**Options**

***network-prefix***—Network prefix (IPv4 or IPv6).

The remaining statements are explained separately.

**Required Privilege Level**

access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- range (Mobile Pools) on page 669

## pool-prefetch-threshold (Mobile Pools)

**Syntax** pool-prefetch-threshold *pool-prefetch-threshold*;

**Hierarchy Level** [edit access address-assignment mobile-pools *name*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the pool usage threshold in the mobile pool for pre-fetching addresses. The pre-fetch threshold is used when the pool is configured with prefixes, and when prefixes are added to an existing pool.

**Default** If you do not configure a value, then the default is used.

**Options** ***pool-prefetch-threshold***—Pre-fetch threshold percentage.

**Range:** 1 through 100

**Default:** 80

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- mobile-pools on page 665

## pool-snmp-trap-threshold (Mobile Pools)

**Syntax** pool-snmp-trap-threshold *pool-snmp-trap-threshold*;

**Hierarchy Level** [edit access address-assignment mobile-pools *name*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the pool usage threshold in the mobile pool for generating SNMP traps. When the percentage of addresses used in the mobile pool exceeds the specified threshold, a notification is sent indicating that the specified threshold has been crossed. After reaching the specified threshold, when the percentage of addresses used in the mobile pool drops 20 percent below the threshold, the notification indicating that the specified threshold was exceeded, is cleared.

**Default** If you do not configure a value, then the default is used.

**Options** ***pool-snmp-trap-threshold***—Threshold percentage.

**Range:** 1 through 100

**Default:** 80

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- mobile-pools on page 665

## range (Mobile Pools)

**Syntax**

```
range {
  [name] {
    external-assigned;
    high high;
    low low;
  }
}
```

**Hierarchy Level**

[edit access address-assignment mobile-pools *name* family inet network *network-prefix*],
[edit access address-assignment mobile-pools *name* family inet6 network *network-prefix*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet network *network-prefix*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name* family inet6 network *network-prefix*]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.

**Description**

Specify the address ranges within the network prefix of the mobile pool. This configuration is optional. If a range is specified, then the broadband gateway assigns addresses only from the specified range.

**Options**

**high *high***—Upper address (IPv4) or prefix (IPv6) of the range.

**low *low***—Lower address (IPv4) or prefix (IPv6) of the range.

NOTE: If you specify a range, then the high and low statements are mandatory.

***name***—Name of the address range.

**Range:** Up to 63 characters

**Syntax:** The name must be unique within a mobile pool.

The remaining statement is explained separately.

**Required Privilege Level**

access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- network (Mobile Pools) on page 666

## service-mode (Mobile Pools)

**Syntax** service-mode *service-mode-options*;

**Hierarchy Level** [edit access address-assignment mobile-pools *name*],
[edit routing-instances *instance-name* access address-assignment mobile-pools *name*]

**Description** Specify that the mobile pool should be in **maintenance** mode. You do this if you want to carry out maintenance tasks like deleting or modifying a mobile pool and so on. See the *Maintenance Mode* chapter in the *MobileNext Broadband Gateway Configuration Guide* for a list of the maintenance tasks that can be carried out when the mobile pool is in maintenance mode.

When in the **Maintenance Mode Active Phase**, all the valid attributes on the object can be modified. In other cases, only the non-maintenance mode attributes can be modified.

**Options** ***service-mode-options***—Specify the service mode. Currently, **maintenance** mode is the only option supported.

**Required Privilege Level** access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

**Related Documentation**

- Changing Address Attributes in the Mobile Address Pool on page 421
- Deleting a Mobile Address Pool on page 422
- mobile-pools on page 665

## DHCP Configuration Statements

## bind-interface

**Syntax** bind-interface *interface-name*;

**Hierarchy Level** [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*],
[edit routing-instances *name* system services dhcp-proxy-client dhcpv6-profiles *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the interface on which the DHCP proxy client communicates with the configured DHCP servers. The primary IPv4 address of the bind interface is the source of DHCP packets for DHCPv4 and the source interface of DHCP control packets for DHCPv6.

For the DHCPv4 proxy client, the interface specified here must be previously configured with the valid **inet** address and **inet address** family. Similarly, for the DHCPv6 proxy client, the interface must be previously configured with the valid **inet6** address and **inet6** family. The interface specified here is configured at the **[edit interfaces]** hierarchy level.

NOTE: You must configure the bind-interface for a DHCPv4 proxy client profile and a DHCPv6 proxy client profile.

**Example 1: Configuring dhcp-proxy-client with interfaces.**

```
ge-0/1/5 {
description "Interface facing DHCP server side";
unit 0 {
 family inet {
  address 10.1.1.1/24;
   }
  }
 }
```

**Example 2: Configuring dhcp-proxy-client v4 profile**

```
services {
 dhcp-proxy-client {
  dhcpv4-profiles dhcp-prof-1 {
   bind-interface ge-0/1/5.0;
   servers 10.1.1.2;
   }
  }
 }
```

**Options** *interface-name*—Name of the previously configured interface.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- DHCP Overview on page 215
- dhcpv4-profiles on page 677
- dhcpv6-profiles on page 678

## dead-server-retry-interval

**Syntax** dead-server-retry-interval *interval-in-seconds*;

**Hierarchy Level** [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the number of seconds before the broadband gateway reconnects with a dead server that was marked down in previous attempts. A server is marked down if there is no response for multiple successive attempts. The number of attempts can be configured using the **dead-server-successive-retry-attempt** statement.

**Options** ***interval-in-seconds***—Interval, in seconds, between retries.

**Range:** 300 through 3600 seconds

**Default:** 300 seconds

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- dead-server-successive-retry-attempt on page 674
- DHCP Overview on page 215
- dhcpv4-profiles on page 677

## dead-server-successive-retry-attempt

**Syntax** dead-server-successive-retry-attempt *number-of-attempts*;

**Hierarchy Level** [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the number of successive retry attempts that the broadband gateway makes to contact a server before declaring an unresponsive server dead. If a server is marked dead, no DHCP packets are sent to the server until the dead timer, specified using the **dead-server-retry-interval** statement, elapses and the server comes alive.

**Options** ***number-of-attempts***—Number of successive attempts between retries.

**Range:** 5 through 1000

**Default:** 10

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- dead-server-retry-interval on page 673
- DHCP Overview on page 215
- dhcpv4-profiles on page 677

## dhcp-proxy-client

**Syntax**

```
dhcp-proxy-client {
  dhcpv4-profiles profile-name {
    bind-interface interface-name;
    dead-server-retry-interval interval-in-seconds;
    dead-server-successive-retry-attempt number-of-attempts;
    dhcp-server-selection-algorithm (highest-priority-server | round-robin);
    lease-time time-in-seconds;
    pool-name pool-name;
    retransmission-attempt  number-of-attempts;
    retransmission-interval interval-in-seconds;
    servers ip-address {
      priority value;
    }
  }
  dhcpv6-profiles profile-name {
    bind-interface interface-name;
    lease-time time-in-seconds;
    pool-name pool-name;
    retransmission-attempt  number-of-attempts;
    retransmission-interval interval-in-seconds;
  }
  traceoptions {
    file {
      filename;
      files files;
      match match;
      (no-world-readable | world-readable);
      size size;
    }
    flag {
      flag;
    }
    no-remote-trace;
  }
}
```

**Hierarchy Level** [edit routing-instances *name* system services]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the Dynamic Host Configuration Protocol (DHCP) proxy client parameters to enable DHCP-based IPv4 or IPv6 address allocation for mobile subscribers.

The DHCP proxy client acquires a subnet (IPv4) or a prefix (IPv6) from the server as per DHCP IETF specifications. After the subnet or prefix is obtained from the server, the DHCP proxy client is managed locally for the mobile subscriber. When all mobile subscribers using the addresses in the subnet or prefix are detached from the GGSN or P-GW, the acquired subnet or prefix is released and the prefix or subnet can be assigned to another GGSN or P-GW by the DHCP server.

The remaining statements are explained separately.

**Required Privilege Level**
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**
- DHCP Overview on page 215
- services (DHCP Proxy Client) on page 684

## dhcp-server-selection-algorithm

**Syntax**
dhcp-server-selection-algorithm (highest-priority-server | round-robin);

**Hierarchy Level**
[edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]

**Release Information**
Statement introduced in Junos OS Mobility Release 11.2W.

**Description**
Specify the algorithm used to select the DHCP server with which to communicate when multiple servers are configured. The DHCP server is selected either by the highest priority or by round-robin method, according to the algorithm specified for server selection.

**Default**
If you do not include this statement, the **round-robin** algorithm is used.

**Options**
***round-robin***—Server is selected in a fixed cyclical order.

***highest-priority-server***—Server with the highest priority is selected. (The server priority is configured using the **priority** statement at the **[edit routing-instances name system services dhcp-proxy-client dhcpv4-profiles name servers address]** hierarchy level.)

**Required Privilege Level**
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**
- DHCP Overview on page 215
- dhcpv4-profiles on page 677
- priority (DHCP Server) on page 681

## dhcpv4-profiles

**Syntax**

```
dhcpv4-profiles profile-name {
  bind-interface interface-name;
  dead-server-retry-interval interval-in-seconds;
  dead-server-successive-retry-attempt number-of-attempts;
  dhcp-server-selection-algorithm (highest-priority-server | round-robin);
  lease-time time-in-seconds;
  pool-name pool-name;
  retransmission-attempt  number-of-attempts;
  retransmission-interval interval-in-seconds;
  servers ip-address {
    priority value;
  }
}
```

**Hierarchy Level** [edit routing-instances *name* system dhcp-proxy-client]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure DHCPv4 proxy client profiles. The access point name (APN) refers to the DHCPv4 profiles to obtain the subnet from the DHCP server.

NOTE: The DHCPv4 profile referenced by the APN is configured using the **profile-name** statement at the [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment dhcpv4-proxy-client-profile] hierarchy level.

A single DHCPv4 profile can be referenced by one or more APNs; alternatively, each APN can be configured to use a different DHCPv4 profile.

**Options** ***profile-name***—Name of the DHCPv4 proxy client profile.

**Range:** Up to 63 characters

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- DHCP Overview on page 215
- dhcp-proxy-client on page 675
- profile-name (APN Address Assignment) on page 775

## dhcpv6-profiles

**Syntax**

```
dhcpv6-profiles profile-name {
  bind-interface interface-name;
  lease-time time-in-seconds;
  pool-name pool-name;
  retransmission-attempt number-of-attempts;
  retransmission-interval interval-in-seconds;
}
```

**Hierarchy Level** [edit routing-instances *name* system dhcp-proxy-client]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure DHCPv6 proxy client profiles. The access point name (APN) refers to the DHCPv6 profiles to obtain the prefix from the DHCP server.

NOTE: The DHCPv6 profile referenced by the APN is configured using the **profile-name** statement at the [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment dhcpv6-proxy-client-profile] hierarchy level.

A single DHCPv6 profile can be referenced by one or more APNs; alternatively, each APN can be configured to use a different DHCPv6 profile.

**Options** ***profile-name***—Name of the DHCPv6 proxy client profile.

**Range:** Up to 63 characters

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- DHCP Overview on page 215
- dhcp-proxy-client on page 675
- profile-name (APN Address Assignment) on page 775

## lease-time (DHCP Proxy Client Profile)

**Syntax** lease-time *time-in-seconds*;

**Hierarchy Level** [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*],
[edit routing-instances *name* system services dhcp-proxy-client dhcpv6-profiles *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the default lease time, in seconds. If the DHCP client does not get the lease time from the DHCP server, it uses the configured default lease time as the lease time.

The lease time indicates the time for which the broadband gateway holds the DHCP subnets or prefixes, if the server does not respond to a renewal request. After the lease time elapses, the subnets or prefixes are removed from the gateway and the subscriber is deleted.

**Default** If the DHCP client does not get the lease time from DHCP server, and if the default lease time is not configured (using this statement), then the gateway holds on to the subnets or prefixes as long as the subscribers, whose addresses are allocated from the subnets or prefixes, are active. The gateway does not renew the subnets or prefixes until the DHCP server sends a FORCE RENEW message.

**Options** ***time-in-seconds***—Number of seconds the lease can be held.

**Range:** 60 through 1000 seconds

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- DHCP Overview on page 215
- dhcpv4-profiles on page 677
- dhcpv6-profiles on page 678

## pool-name (DHCP Proxy Client Profile)

**Syntax** pool-name *pool-name*;

**Hierarchy Level** [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*],
[edit routing-instances *name* system services dhcp-proxy-client dhcpv6-profiles *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify a name for the DHCP server address pool. The broadband gateway requests the DHCP server for a subnet or prefix from the configured pool name. The specified pool name is sent to the DHCP server in the DHCP Discover and Request message in **subnet-name-suboption** of **subnet-allocation-option**.

This configuration is optional; therefore, the pool name is sent only when it is configured.

**Options** ***pool-name***—Name of the pool.

**Range:** Up to 63 characters

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- DHCP Overview on page 215
- dhcpv4-profiles on page 677
- dhcpv6-profiles on page 678

## priority (DHCP Server)

**Syntax** priority *priority*;

**Hierarchy Level** [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name* servers *address*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the DHCP server priority. If the algorithm for server selection is based on the highest priority, then the broadband gateway uses the configured priority to select the active server with the highest priority. The DHCP Discover message is then sent to the selected server.

**Options** ***server-priority***—Priority for the DHCP server.

**Default:** 3

**Range:** 1 (highest priority) to 5 (lowest priority)

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- DHCP Overview on page 215
- dhcp-server-selection-algorithm on page 676
- servers (DHCP Proxy Client Profiles) on page 683

## retransmission-attempt (DHCP Proxy Client Profiles)

**Syntax** retransmission-attempt *number-of-attempts*;

**Hierarchy Level** [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*],
[edit routing-instances *name* system services dhcp-proxy-client dhcpv6-profiles *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the maximum number of times that the system attempts to communicate with the unresponsive DHCP server before each subnet allocation request is deemed as failed.

**Options** ***number***—Number of attempts to retransmit the packet.

**Range:** 0 through 1000

**Default:** 4

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- DHCP Overview on page 215
- dhcpv4-profiles on page 677
- dhcpv6-profiles on page 678

## retransmission-interval (DHCP Proxy Client Profiles)

**Syntax** retransmission-interval *interval-in-seconds*;

**Hierarchy Level** [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*],
[edit routing-instances *name* system services dhcp-proxy-client dhcpv6-profiles *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the amount of time that must pass with no response before the system reattempts to communicate with the DHCP server.

**Options** ***interval-in-seconds***—Number of seconds between successive retransmissions.

**Range:** 4 through 64

**Default:** 4

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- DHCP Overview on page 215
- dhcpv4-profiles on page 677
- dhcpv6-profiles on page 678

## servers (DHCP Proxy Client Profiles)

**Syntax**

```
servers ip-address {
    priority value;
}
```

**Hierarchy Level** [edit routing-instances *name* system services dhcp-proxy-client dhcpv4-profiles *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the list of DHCP servers with which the DHCP proxy clients communicate to obtain the IPv4 subnet , which is used to allocate IP addresses to mobile subscribers on the broadband gateway.

This configuration is applicable only to DHCPv4 profiles. You must configure at least one server.

**Options** **ip-address**—IPv4 address of the server.

The remaining statement is explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- DHCP Overview on page 215
- dhcpv4-profiles on page 677

## services (DHCP Proxy Client)

**Syntax**

```
services {
  dhcp-proxy-client {
    dhcpv4-profiles profile-name {
      bind-interface interface-name;
      dead-server-retry-interval interval-in-seconds;
      dead-server-successive-retry-attempt number-of-attempts;
      dhcp-server-selection-algorithm (highest-priority-server | round-robin);
      lease-time time-in-seconds;
      pool-name pool-name;
      retransmission-attempt  number-of-attempts;
      retransmission-interval interval-in-seconds;
      servers ip-address {
        priority value;
      }
    }
    dhcpv6-profiles profile-name {
      bind-interface interface-name;
      lease-time time-in-seconds;
      pool-name pool-name;
      retransmission-attempt  number-of-attempts;
      retransmission-interval interval-in-seconds;
    }
    traceoptions {
      file {
        filename;
        files files;
        match match;
        (no-world-readable | world-readable);
        size size;
      }
      flag {
        flag;
      }
      no-remote-trace;
    }
}
```

**Hierarchy Level** [edit routing-instances *name* system]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the DHCPv4 and DHCPv6 proxy client profiles.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- DHCP Overview on page 215
- system (DHCP Proxy Client) on page 685

## system (DHCP Proxy Client)

**Syntax**

```
system {
  services {
    dhcp-proxy-client {
      dhcpv4-profiles profile-name {
        bind-interface interface-name;
        dead-server-retry-interval interval-in-seconds;
        dead-server-successive-retry-attempt number-of-attempts;
        dhcp-server-selection-algorithm (highest-priority-server | round-robin);
        lease-time time-in-seconds;
        pool-name pool-name;
        retransmission-attempt  number-of-attempts;
        retransmission-interval interval-in-seconds;
        servers ip-address {
          priority value;
        }
      }
      dhcpv6-profiles profile-name {
        bind-interface interface-name;
        lease-time time-in-seconds;
        pool-name pool-name;
        retransmission-attempt  number-of-attempts;
        retransmission-interval interval-in-seconds;
      }
      traceoptions {
        file {
          filename;
          files files;
          match match;
          (no-world-readable | world-readable);
          size size;
        }
        flag {
          flag;
        }
        no-remote-trace;
      }
    }
  }
```

**Hierarchy Level** [edit routing-instances]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the DHCPv4 and DHCPv6 proxy client profiles.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- [edit routing-instance system] Hierarchy Level on page 597
- DHCP Overview on page 215

## traceoptions (DHCP Proxy Client)

**Syntax**

```
traceoptions {
  file {
    filename;
    files files;
    match match;
    (no-world-readable | world-readable);
    size size;
  }
  flag {
    flag;
  }
  no-remote-trace;
}
```

**Hierarchy Level** [edit routing-instances *name* system services dhcp-proxy-client]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Define global tracing operations for DHCP proxy client.

**Options** ***filename***—Name of the file that receives the output of the tracing operation. All files are placed in the **/var/log** directory.

**files *files***—(Optional) Maximum number of trace files. When a trace file named **trace-file** reaches its maximum size, it is renamed **trace-file.0**, then **trace-file.1**, and so on, until the maximum number of trace files is reached. Then, the oldest trace file is overwritten.

If you specify a maximum number of files, you must also specify a maximum file size with the **size** option and a filename.

**Range:** 2 through 1000

**Default:** 3 files

**flag**

- *flag*—You can use one of the following flags:
  - **all**—Trace all operations.
  - **auth**—Trace authentication operations.
  - **database**—Trace database operations.
  - **fwd**—Trace firewall process operations.
  - **general**—Trace miscellaneous opertions.
  - **ha**—Trace operations related to high availability.
  - **interface**—Trace interface operations.

- **io**—Trace I/O operations.
- **packet**—Trace packet decoding operations.
- **performance**—Trace performance measurement operations.
- **profile**—Trace profile operations.
- **rpd**—Trace routing protocol process operations.
- **rtsock**—Trace routing socket operations.
- **session-db**—Trace session database operations.
- **state**—Trace state transition operations.
- **statistics**—Trace statistics operations.
- **ui**—Trace user interface operations.

**match *match***—(Optional) Refine the output to include lines that contain the regular expression.

**no-remote-trace**—(Optional) Disable remote tracing.

**no-world-readable**—(Optional) Restrict access to the originator of the trace operation only.

**size *size***—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). If you specify a maximum file size, you must also specify a maximum number of trace files with the **files** option and filename.

**Syntax:** **xk** to specify KB, **xm** to specify MB, or **xg** to specify GB

**Range:** 10 KB through 1 GB

**Default:** 128 KB

**world-readable**—(Optional) Enable unrestricted file access.

**Required Privilege Level**

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- DHCP Overview on page 215
- dhcp-proxy-client on page 675

CHAPTER 20

# Anchor Packet Forwarding Engine Redundancy and Aggregated Multiservices High Availability Configuration Statements

## pfes

**Syntax**

```
pfes {
  [interface interface-name];
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* system],
[edit unified-edge gateways sgw *gateway-name* system]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* system]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

Specify the interfaces used for anchoring subscribers in the Packet Forwarding Engine in the broadband gateway.

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Anchor Session DPCs and PFEs on page 67
- system (MobileNext Broadband Gateway Interfaces) on page 718

## service-pics

**Syntax**

```
service-pics {
  [interface interface-name];
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* system]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the interfaces used for anchoring mobile subscriber-aware services in the broadband gateway.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- system (MobileNext Broadband Gateway Interfaces) on page 718

## session-pics

**Syntax**

```
session-pics {
  [interface interface-name];
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* system],
[edit unified-edge gateways sgw *gateway-name* system]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* system]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the interfaces used for the mobile control plane in the broadband gateway.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Anchor Session DPCs and PFEs on page 67
- system (MobileNext Broadband Gateway Interfaces) on page 718

## anchoring-options (Aggregated Packet Forwarding Engine)

**Syntax**

```
anchoring-options {
  apfe-group-set apfe-group-set;
  primary-list {
    [anchoring-device-name];
  }
  secondary anchoring-device-name;
  warm-standby;
}
```

**Hierarchy Level** [edit interfaces *interface-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the options for the anchor Packet Forwarding Engine redundancy. The redundancy options are configured at the level of the Flexible PIC Concentrator (FPC). The FPCs that are configured for redundancy must be of the same type—that is, they must have the same number of Packet Forwarding Engines and the same forwarding capabilities.

The type of redundancy supported is many-to-one (N:1), which means that one Packet Forwarding Engine acts as the backup for one or more (N) Packet Forwarding Engines. When you configure FPCs for anchor Packet Forwarding Engine redundancy, the corresponding anchor Packet Forwarding Engines in each FPC are configured for N:1 redundancy. The first Packet Forwarding Engine of each primary FPC is backed up by the first Packet Forwarding Engine of the backup FPC, the second Packet Forwarding Engine of each primary FPC is backed up by the second Packet Forwarding Engine of the backup FPC, and so on.

For example, consider the case when you configure three FPCs—FPC1, FPC2, and FPC3—for redundancy with FPC1 and FPC2 as primary members, and FPC3 as backup. If each FPC has two Packet Forwarding Engines (PFE0 and PFE1), then FPC1-PFE0 and FPC2-PFE0 are backed up by FPC3-PFE0. Similarly, FPC1-PFE1 and FPC2-PFE1 are backed up by FPC3-PFE1.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Interface Redundancy on page 74
- Configuring Interface DPCs or MPCs for User Mobility Traffic on page 64
- Example: Configuring Broadband Gateway Redundancy on page 78
- **interfaces (Aggregated Packet Forwarding Engine) on page 704**

## apfe-group-set (Aggregated Packet Forwarding Engine)

**Syntax** apfe-group-set *apfe-group-set*;

**Hierarchy Level** [edit interfaces *interface-name* anchoring-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify that the anchor Packet Forwarding Engines belonging to the FPCs configured for redundancy should belong to an aggregated Packet Forwarding Engine (apfe) group set. When you specify an apfe group set, the FPCs configured on the different **apfe** interfaces share the same fate.

For example, you configure two **apfe** interfaces: **apfe0** and **apfe1**. This means that if an anchor Packet Forwarding Engine on an FPC in **apfe0** switches to the corresponding backup anchor Packet Forwarding Engine on the backup FPC, then the anchor Packet Forwarding Engine on the corresponding FPC in **afpe1** also switches to the corresponding backup anchor Packet Forwarding Engine on the backup FPC.

NOTE: The **apfe-group-set** is configured at the **apfe** level. Since the **apfe** interfaces have Packet Forwarding Engine interfaces (**pfe-**) as their members, the **apfe-group-set** configuration groups interfaces at the Packet Forwarding Engine level rather than at the FPC level.

**Default** If you do not configure the **apfe-group-set** statement, then the **apfe** interface that you configure behaves as a standalone entity and it is not influenced by other **apfe** interfaces configured on the broadband gateway.

**Options** ***apfe-group-set***—Name of the apfe group set.
**Range:** Up to 32 characters

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- anchoring-options (Aggregated Packet Forwarding Engine) on page 691
- Configuring Interface Redundancy on page 74
- Example: Configuring Broadband Gateway Redundancy on page 78

## dedicated (IPsec)

**Syntax** dedicated;

**Hierarchy Level** [edit interfaces *interface-name* unit *interface-unit-number* dial-options]

**Release Information** Statement introduced before Junos OS Release 7.4.

**Description** Specify that Dynamic End Point (DEP) IP Security (IPsec) tunnels are supported in dedicated logical interface (**ifl**) mode for the aggregated multiservices (AMS) interface. In dedicated **ifl** mode, each DEP IPsec tunnel is mapped to one AMS **ifl**.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**
- dial-options (IPsec) on page 693
- shared (IPsec) on page 717

## dial-options (IPsec)

**Syntax**
```
dial-options {
    (dedicated | shared);
    ipsec-interface-id ipsec-interface-id;
}
```

**Hierarchy Level** [edit interfaces *interface-name* unit *interface-unit-number*]

**Release Information** Statement introduced before Junos OS Release 7.4.

**Description** Configure the parameters to support Dynamic End Point (DEP) IP Security (IPsec) tunnels on the aggregated multiservices (AMS) interface. DEP IPsec tunnels are supported in two modes: dedicated logical interface (**ifl**) mode and shared **ifl** mode.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**
- unit (Aggregated Multiservices) on page 719

## drop-member-traffic (Aggregated Multiservices)

**Syntax**

```
drop-member-traffic {
  enable-rejoin;
  rejoin-timeout rejoin-timeout;
}
```

**Hierarchy Level** [edit interfaces *interface-name* load-balancing-options member-failure-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify whether the broadband gateway should drop traffic to a multiservices PIC when it fails.

- For one-to-one (1:1) mobile control plane redundancy, this configuration is valid only when both multiservices PICs have failed.
- For many-to-one (N:1) high availability (HA) for service applications (application-level gateway [ALG], Network Address Translation [NAT], and stateful firewall), this configuration is valid only when two or more multiservices PICs have failed.

The remaining statements are explained separately.

NOTE: If you configure the **drop-member-traffic** statement, then you cannot configure the **redistribute-all-traffic** statement; that is, they are mutually exclusive.

**Default** If this statement is not configured, then the default behavior is to drop member traffic with a rejoin timeout of 120 seconds. If the member does not come back online within this time, then it must be manually brought back into the AMS interface, using the **request interface load-balancing revert** command.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Session DPC Redundancy on page 72
- Example: Configuring Broadband Gateway Redundancy on page 78
- member-failure-options (Aggregated Multiservices) on page 709
- request interface load-balancing revert (Aggregated Multiservices) on page 1130

## enable-rejoin (Aggregated Multiservices)

**Syntax** enable-rejoin;

**Hierarchy Level** [edit interfaces *interface-name* load-balancing-options member-failure-options drop-member-traffic],
[edit interfaces *interface-name* load-balancing-options member-failure-options redistribute-all-traffic]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W. Support for the **[edit interfaces *interface-name* load-balancing-options member-failure-options drop-member-traffic]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Enable the failed member to rejoin the aggregated multiservices (AMS) interface after the member comes back online.

- For one-to-one (1:1) mobile control plane redundancy, this configuration is used in case both members fail, and it allows the members to rejoin the **ams** interface automatically.
- For many-to-one (N:1) high availability (HA) for service applications (application-level gateway [ALG], Network Address Translation [NAT], and stateful firewall), this configuration allows the failed members to rejoin the pool of active members automatically.

**Default** If you do not configure this option, then the failed members do not automatically rejoin the **ams** interface even after coming back online. For this reason, the inactive member cannot be the backup for the active member (even after it comes back online) unless the **request interface load-balancing revert** command is explicitly issued to return the inactive member to the active state.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Session DPC Redundancy on page 72
- **drop-member-traffic (Aggregated Multiservices) on page 694**
- Example: Configuring Broadband Gateway Redundancy on page 78
- **redistribute-all-traffic (Aggregated Multiservices) on page 715**
- **request interface load-balancing revert (Aggregated Multiservices) on page 1130**

## family (Aggregated Multiservices)

**Syntax** family *family*;

**Hierarchy Level** [edit interfaces *interface-name* unit *interface-unit-number*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure protocol family information for the logical interface.

**Options** ***family***—Protocol family. Currently, only one option, **inet** (IP version 4 suite), is supported.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Session DPC Redundancy on page 72
- Example: Configuring Broadband Gateway Redundancy on page 78
- **unit (Aggregated Multiservices) on page 719**

## high-availability-options (Aggregated Multiservices)

**Syntax**

```
high-availability-options {
  many-to-one {
    preferred-backup preferred-backup;
  }
}
```

**Hierarchy Level** [edit interfaces *interface-name* load-balancing-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the high availability options for the aggregated multiservices (AMS) interface. This configuration is mandatory for mobile control plane redundancy. For service applications, if only the load-balancing feature is being used, then this configuration is optional.

- For one-to-one (1:1) mobile control plane redundancy, the preferred backup multiservices PIC, in hot standby mode, backs up one multiservices PIC.
- For many-to-one (N:1) high availability support for service applications (application-level gateway [ALG], Network Address Translation [NAT], and stateful firewall), the preferred backup multiservices PIC, in hot standby mode, backs up one or more (N) active multiservices PICs.

NOTE: In both cases, if one of the active multiservices PICs goes down, then the backup replaces it as the active multiservices PIC. When the failed PIC comes back up, it becomes the new backup. This is called floating backup.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Session DPC Redundancy on page 72
- Example: Configuring Broadband Gateway Redundancy on page 78
- load-balancing-options (Aggregated Multiservices) on page 706

## interface (Packet Forwarding Engine)

**Syntax** [interface *interface-name*];

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* system pfes],
[edit unified-edge gateways sgw *gateway-name* system pfes]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the [edit unified-edge gateways sgw *gateway-name* system pfes] hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the interface representing the Packet Forwarding Engine used for anchoring subscribers in the broadband gateway. The following conditions are applicable to the Packet Forwarding Engine interfaces configured here:

- The aggregated Packet Forwarding Engine interfaces (**apfe**) specified in this statement must already be defined at the **[edit interfaces]** hierarchy level.
- For a broadband gateway configured as a gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW), the Packet Forwarding Engine interfaces must have **mobility ggsn-pgw** as their forwarding package at **[edit chassis fpc *fpc-slot* pfe *pfe-id* forwarding-packages]** hierarchy level.

  NOTE: If the specified Packet Forwarding Engine interface is an **apfe** interface, then all the member interfaces of the **apfe** interface must have **mobility ggsn-pgw** as their forwarding package (at the **[edit chassis fpc *fpc-slot* pfe *pfe-id* forwarding-packages]** hierarchy level).

- For a broadband gateway configured as a Serving Gateway (S-GW), the Packet Forwarding Engine interfaces must have **mobility sgw** as their forwarding package at the **[edit chassis fpc *fpc-slot* pfe *pfe-id* forwarding-packages]** hierarchy level.

  NOTE: If the specified Packet Forwarding Engine interface is an **apfe** interface, then all member interfaces of the **apfe** interface must have **mobility sgw** as their forwarding package (at the **[edit chassis fpc *fpc-slot* pfe *pfe-id* forwarding-packages]** hierarchy levels).

- If a Packet Forwarding Engine interface is a member of an **apfe** interface, then that interface cannot be specified here. For example, if **pfe-2/0/0** is a member interface of **apfe** interface **apfe0**, then **pfe-2/0/0** cannot be directly specified here.

**Options** *interface-name*—Name of the interface representing the Packet Forwarding Engine.

**Syntax:** The interface must be a valid Packet Forwarding Engine interface (**apfe** or **pfe-**); for example, **apfe0** or **pfe-1/0/0**.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- pfes on page 689
- Configuring Interface Redundancy on page 74
- Configuring Interface DPCs or MPCs for User Mobility Traffic on page 64
- Example: Configuring Broadband Gateway Redundancy on page 78
- show unified-edge ggsn-pgw system interfaces on page 1142
- show unified-edge sgw system interfaces on page 1144

## interface (Services PIC)

**Syntax** [interface *interface-name*];

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* system service-pics]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the interface representing the services PIC used for anchoring services-related subscriber sessions in the broadband gateway. The following conditions are applicable to the services PIC interfaces configured here:

- The aggregated multiservices interfaces (**ams**) specified in this statement must already be defined at the **[edit interfaces]** hierarchy level.
- The services PIC must have the **jservices-hcm**, **jservices-mss**, and **jservices-crypto-base** packages configured at the **[edit chassis fpc** *slot-number* **pic** *pic-number* **adaptive-services service-package extension-provider]** hierarchy level.
- If a services PIC interface is a member of an aggregated multiservices interface, then that member interface cannot be specified here. For example, if **mams-2/0/0** is a member interface of the aggregated multiservices interface **ams0**, then **ms-2/0/0/** cannot be directly specified here.

NOTE: If an aggregated multiservices interface (for example ams0) is used for HTTP header enrichment, then load balancing is performed to anchor subcriber-aware services in one of the member interfaces. Otherwise, load balancing is not performed.

**Options** *interface-name*—Name of the interface representing the services PIC.

**Syntax:** The interface must be a valid multiservices interface (**ams** or **ms-a/b/0**, where **a** is the Flexible PIC Concentrator [FPC] slot number and **b** is the PIC slot number); for example, **ams0** or **ms-1/0/0**.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Example: Configuring the MobileNext Broadband Gateway Chassis
- service-pics on page 690
- show unified-edge ggsn-pgw system interfaces on page 1142

## interface (Session PIC)

**Syntax** [interface *interface-name*];

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* system session-pics],
[edit unified-edge gateways sgw *gateway-name* system session-pics]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* system session-pics]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the interface representing the session PIC used for the mobile control plane in the broadband gateway. The following conditions are applicable to the session PIC interfaces configured here:

- The aggregated multiservices interfaces (**ams**) specified in this statement must already be defined at the **[edit interfaces]** hierarchy level.
- The session PIC must have the **jservices-mobile** package configured at the **[edit chassis fpc *slot-number* pic *pic-number* adaptive-services service-package extension-provider]** hierarchy level.
- If a session PIC interface is a member of an aggregated multiservices interface, then that member interface cannot be specified here. For example, if **mams-2/0/0** is a member interface of the aggregated multiservices interface **ams0**, then **ms-2/0/0/** cannot be directly specified here.

**Options** *interface-name*—Name of the interface representing the session PIC.

**Syntax:** The interface must be a valid multiservices interface (**ams** or **ms-a/b/0**, where **a** is the Flexible PIC Concentrator [FPC] slot number and **b** is the PIC slot number); for example, **ams0** or **ms-1/0/0**.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Anchor Session DPCs and PFEs on page 67
- session-pics on page 690
- show unified-edge ggsn-pgw system interfaces on page 1142
- show unified-edge sgw system interfaces on page 1144

## interfaces (Aggregated Multiservices)

**Syntax**

```
interfaces interface-name {
  load-balancing-options {
    high-availability-options {
      many-to-one {
        preferred-backup preferred-backup;
      }
    }
    member-failure-options {
      drop-member-traffic {
        enable-rejoin;
        rejoin-timeout rejoin-timeout;
      }
      redistribute-all-traffic {
        enable-rejoin;
      }
    }
    member-interface interface-name;
  }
  unit interface-unit-number {
    dial-options {
      (dedicated | shared);
      ipsec-interface-id ipsec-interface-id;
    }
    family family;
    load-balancing-options {
      preferred-active interface-name;
    }
  }
}
```

**Hierarchy Level** [edit]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the aggregated multiservices (AMS) interface. The AMS interface provides the infrastructure for load balancing and high availability (HA).

The high availability feature is used for mobile control plane redundancy and for service applications (application-level gateway [ALG], Network Address Translation [NAT], and stateful firewall). The load-balancing feature is currently used only for service applications. For service applications, load balancing can be used with or without high availability. Mobile control plane load balancing is done by the ingress Packet Forwarding Engine.

NOTE: The interfaces must be valid aggregated multiservices interfaces (ams); for example, ams0 or ams1, and so on. The ams infrastructure is supported only in chassis with Trio-based modules and Multiservices Dense Port Concentrators (MS-DPCs).

The remaining statements are explained separately.

**Options**

**interface-name**—Name of the aggregated multiservices interface (**ams**); for example, **ams0** or **ams1**, and so on.

**Required Privilege Level**

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Session DPC Redundancy on page 72
- Example: Configuring Broadband Gateway Redundancy on page 78

## interfaces (Aggregated Packet Forwarding Engine)

**Syntax**

```
interfaces interface-name {
  anchoring-options {
    apfe-group-set apfe-group-set;
    primary-list {
      [anchoring-device-name];
    }
    secondary anchoring-device-name;
    warm-standby;
  }
}
```

**Hierarchy Level** [edit]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the aggregated Packet Forwarding Engine interface (**apfe**) used for anchor Packet Forwarding Engine redundancy on the broadband gateway.

The type of redundancy supported is many-to-one (N:1), which means that one Packet Forwarding Engine acts as the backup for one or more (N) Packet Forwarding Engines. When you configure Flexible PIC Concentrators (FPCs) for anchor Packet Forwarding Engine redundancy, the corresponding anchor Packet Forwarding Engines in each FPC are configured for N:1 redundancy. The first Packet Forwarding Engine of each primary FPC is backed up by the first Packet Forwarding Engine of the backup FPC, the second Packet Forwarding Engine of each primary FPC is backed up by the second Packet Forwarding Engine of the backup FPC, and so on.

NOTE: **The interfaces must be valid apfe interfaces; for example, apfe0 or apfe1.**

The remaining statements are explained separately.

**Options** **interface-name**—Name of the aggregated Packet Forwarding Engine interface (**apfe**); for example, **apfe0** or **apfe1**, and so on.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Interface Redundancy on page 74
- Example: Configuring Broadband Gateway Redundancy on page 78

## ipsec-interface-id (IPsec)

**Syntax** ipsec-interface-id *ipsec-interface-id*;

**Hierarchy Level** [edit interfaces *interface-name* unit *interface-unit-number* dial-options]

**Release Information** Statement introduced before Junos OS Release 7.4.

**Description** Configure the IP Security (IPsec) interface identifier for a group of Dynamic End Point (DEP) peers.

**Options** ***ip-sec-interface-id***—IPsec interface identifier.

**Range:** 1 through 63 characters

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- dial-options (IPsec) on page 693

## load-balancing-options (Aggregated Multiservices)

**Syntax**

```
load-balancing-options {
  high-availability-options {
    many-to-one {
      preferred-backup preferred-backup;
    }
  }
  member-failure-options {
    drop-member-traffic {
      enable-rejoin;
      rejoin-timeout rejoin-timeout;
    }
    redistribute-all-traffic {
      enable-rejoin;
    }
  }
  member-interface interface-name;
}
```

**Hierarchy Level** [edit interfaces *interface-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the high availability (HA) options for the aggregated multiservices (AMS) interface.

The following modes of high availability are supported with AMS:

- One-to-one (1:1) mobile control plane redundancy—In this case, one active multiservices PIC is backed up by one standby multiservices PIC in hot standby mode.
- Many-to-one (N:1) high availability for service applications (application-level gateway [ALG], Network Address Translation [NAT], and stateful firewall)—In this case, one multiservices PIC is the backup (in hot standby mode) for one or more (N) active multiservices PICs. If one of the active multiservices PICs goes down, then the backup replaces it as the active multiservices PIC. When the failed PIC comes back online, it becomes the new backup. This is called floating backup mode.

NOTE: In hot standby mode, the operational state of subscribers anchored on the active multiservices PIC (or PICs) is actively synchronized with the standby multiservices PIC.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Session DPC Redundancy on page 72
- Example: Configuring Broadband Gateway Redundancy on page 78
- interfaces (Aggregated Multiservices) on page 702

## load-balancing-options (IPsec)

**Syntax**

```
load-balancing-options {
  preferred-active interface-name;
}
```

**Hierarchy Level** [edit interfaces *interface-name* unit *interface-unit-number*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the preferred active member to be used for load balancing the Dynamic End Point (DEP) IP Security (IPsec) tunnels on the aggregated multiservices (AMS) interface. The DEP IPSec tunnels are distributed across the members configured for the AMS interface. However, the active next hop corresponds only to the preferred active member configured here. All other next hops are on standby and no traffic is directed to those members.

The remaining statement is explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- unit (Aggregated Multiservices) on page 719

## many-to-one (Aggregated Multiservices)

**Syntax**

```
many-to-one {
  preferred-backup preferred-backup;
}
```

**Hierarchy Level** [edit interfaces *interface-name* load-balancing-options high-availability-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the initial preferred backup for the aggregated multiservices (AMS) interface.

NOTE: The preferred backup must be one of the member interfaces (mams–) that have already been configured at the [edit interfaces *interface-name* load-balancing-options] hierarchy level. Even in the case of mobile control plane redundancy, which is one-to-one (1:1), the initial preferred backup is configured at this hierarchy level.

The remaining statements are explained separately.

**Options** **preferred-backup *preferred-backup***—Name of the preferred backup member interface. The member interface format is **mams-a/b/0**, where **a** is the Flexible PIC Concentrator (FPC) slot number and **b** is the PIC slot number.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Session DPC Redundancy on page 72
- Example: Configuring Broadband Gateway Redundancy on page 78
- high-availability-options (Aggregated Multiservices) on page 697

## member-failure-options (Aggregated Multiservices)

**Syntax**

```
member-failure-options {
  drop-member-traffic {
    enable-rejoin;
    rejoin-timeout rejoin-timeout;
  }
  redistribute-all-traffic {
    enable-rejoin;
  }
}
```

**Hierarchy Level** [edit interfaces *interface-name* load-balancing-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the possible behavior for the aggregated multiservices (AMS) interface in case of failure of more than one active member.

NOTE: The **drop-member-traffic** configuration and the **redistribute-all-traffic** configuration are mutually exclusive.

Table 55 on page 709 displays the behavior of the member interface after the failure of the first multiservices PIC. Table 56 on page 710 displays the behavior of the member interface after the failure of two multiservices PICs.

NOTE: The AMS infrastructure has been designed to handle one failure automatically. However, in the unlikely event that more than one multiservices PIC fails, the AMS infrastructure provides configuration options to minimize the impact on existing traffic flows.

### Table 55: Behavior of Member Interface After One Multiservices PIC Fails

| High Availability Mode | Member Interface Behavior |
|---|---|
| One-to-one (1:1) mobile control plane redundancy | Automatically handled by the AMS infrastructure |
| Many-to-one (N:1) high availability support for service applications | Automatically handled by the AMS infrastructure |

Table 56: Behavior of Member Interface After Two Multiservices PICs Fail

| High Availability Mode | Configuration | rejoin-timeout | enable-rejoin | Behavior when member rejoins before rejoin-timeout expires | Behavior when member rejoins after rejoin-timeout expires |
|---|---|---|---|---|---|
| One-to-one (1:1) mobile control plane redundancy | **drop-member-traffic** | Configured | Not configured | The traffic is dropped since both members are down.<br><br>The first member to rejoin becomes the active member. The second member to rejoin becomes the backup. This behavior is handled automatically by the AMS infrastructure. | The traffic is dropped since both members are down. Both members are moved to the inactive state.<br><br>An explicit **request interface load-balancing revert** command is required to make both members rejoin the AMS. |
| One-to-one (1:1) mobile control plane redundancy | **drop-member-traffic** | Configured | Configured | The traffic is dropped since both members are down. The first member to rejoin becomes the active member. The second member to rejoin becomes the backup. This behavior is handled automatically by the AMS infrastructure. | The traffic is dropped since both members are down. The first member to rejoin becomes the active member. The second member to rejoin becomes the backup. This behavior is handled automatically by the AMS infrastructure. |
| One-to-one (1:1) mobile control plane redundancy | **redistribute-all-traffic** | Not applicable | Not configured | The traffic is dropped since both members are down. Both members are moved to the inactive state.<br><br>An explicit **request interface load-balancing revert** command is required to make both members rejoin the AMS. | |
| One-to-one (1:1) mobile control plane redundancy | **redistribute-all-traffic** | Not applicable | Configured | The traffic is dropped since both members are down.<br><br>The first member to rejoin becomes the active member. The second member to rejoin becomes the backup. This behavior is handled automatically by the AMS infrastructure. | |
| Many-to-one (N:1) high availability support for service applications | **drop-member-traffic** | Configured | Not configured | The existing traffic for the second failed member is *not* redistributed to the other members. The member is moved to the discard state.<br><br>If the member comes back up before the rejoin timeout expires, the traffic is restored to the member and the | The existing traffic for the second failed member is *not* redistributed to the other members.<br><br>The first member rejoins the AMS automatically. However, the other members who are rejoining are moved to the inactive state. An explicit **request interface load-balancing revert** |

Table 56: Behavior of Member Interface After Two Multiservices PICs Fail *(continued)*

| High Availability Mode | Configuration | rejoin-timeout | enable-rejoin | Behavior when member rejoins before rejoin-timeout expires | Behavior when member rejoins after rejoin-timeout expires |
|---|---|---|---|---|---|
| | | | | member is moved to the active state. | command is required to make these members rejoin the AMS. |
| Many-to-one (N:1) high availability support for service applications | **drop-member-traffic** | Configured | Configured | The existing traffic for the second failed member is not redistributed to the other members. The first member to rejoin becomes an active member.<br><br>The second member to rejoin becomes the backup. This behavior is handled automatically by the AMS infrastructure. | The existing traffic for the second failed member is not redistributed to the other members until the rejoin timeout expires. Once the rejoin timeout expires, the traffic is redistributed to the other members.<br><br>The first member to rejoin becomes an active member. The second member to rejoin becomes the backup. This behavior is handled automatically by the AMS infrastructure. |
| Many-to-one (N:1) high availability support for service applications | **redistribute-all-traffic** | Not applicable | Not configured | The traffic is dropped since both members are down. Both members are moved to the inactive state.<br><br>An explicit **request interface load-balancing revert** command is required to make both members rejoin the AMS. | |
| Many-to-one (N:1) high availability support for service applications | **redistribute-all-traffic** | Not applicable | Configured | Before rejoin, the traffic is redistributed to existing active members.<br><br>After a failed member rejoins, the traffic is load-balanced again. This may impact existing traffic flows. | |

The remaining statements are explained separately.

**Default** If **member-failure-options** are not configured, then the default behavior is to drop member traffic with a rejoin timeout of 120 seconds. If the member does not come back online within this time, then it must be manually brought back into the AMS interface, using the **request interface load-balancing revert** command.

**Required Privilege Level**
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Session DPC Redundancy on page 72
- Example: Configuring Broadband Gateway Redundancy on page 78
- load-balancing-options (Aggregated Multiservices) on page 706
- request interface load-balancing revert (Aggregated Multiservices) on page 1130

## member-interface (Aggregated Multiservices)

**Syntax** member-interface *interface-name*;

**Hierarchy Level** [edit interfaces *interface-name* load-balancing-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the member interfaces for the aggregated multiservices (AMS) interface. You can configure multiple interfaces by specifying each interface in a separate statement.

- For mobile control plane redundancy, which supports one-to-one (1:1) redundancy, you must specify only two interfaces.
- For high availability service applications (application-level gateway [ALG], Network Address Translation [NAT], and stateful firewall) that support many-to-one (N:1) redundancy, you can specify two or more interfaces.

NOTE: The member interfaces that you specify must be members of aggregated multiservices interfaces (mams-) on the broadband gateway.

The remaining statements are explained separately.

**Options** *interface-name*—Name of the member interface. The member interface format is **mams-a/b/0**, where **a** is the Flexible PIC Concentrator (FPC) slot number and **b** is the PIC slot number.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Session DPC Redundancy on page 72
- Example: Configuring Broadband Gateway Redundancy on page 78
- load-balancing-options (Aggregated Multiservices) on page 706

## preferred-active (IPsec)

**Syntax** preferred-active *interface-name*;

**Hierarchy Level** [edit interfaces *interface-name* unit *interface-unit-number* load-balancing-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the preferred active member to be used for load balancing the Dynamic End Point (DEP) IP Security (IPsec) tunnels on the aggregated multiservices (AMS) interface. The following conditions are applicable for the preferred active member configured here:

- The preferred active member should already be configured as a member of the AMS interface. (To configure a member interface under AMS, use **set member-interface *interface-name*** at the **[edit interfaces *interface-name* load-balancing-options]** hierarchy level.)
- The preferred active member must not be already configured as the preferred backup for the AMS interface.
- If you configure load balancing, then the configuration of the preferred active member is mandatory.

**Options** ***interface-name***—Name of the member of AMS interface (**mams-**); for example, **mams-1/0/0**.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**
- load-balancing-options (IPsec) on page 707

## primary-list (Aggregated Packet Forwarding Engine)

**Syntax**

```
primary-list {
  [anchoring-device-name];
}
```

**Hierarchy Level** [edit interfaces *interface-name* anchoring-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the primary Flexible PIC Concentrators (FPCs) for the anchor Packet Forwarding Engine redundancy.

NOTE: You can configure the primary list to contain multiple FPCs. However, all the FPCs must be of the same type—that is, they should have the same number of Packet Forwarding Engines and the same forwarding capabilities.

To configure multiple primary FPCs, include the **anchoring-device-name** statement multiple times.

**Options** ***anchoring-device-name***—Name of the FPC.

NOTE: The interface must be a valid interface (fpc-) that is defined in the broadband gateway interface hierarchy.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- anchoring-options (Aggregated Packet Forwarding Engine) on page 691
- Configuring Interface Redundancy on page 74
- Configuring Interface DPCs or MPCs for User Mobility Traffic on page 64
- Example: Configuring Broadband Gateway Redundancy on page 78

## redistribute-all-traffic (Aggregated Multiservices)

**Syntax**

```
redistribute-all-traffic {
  enable-rejoin;
}
```

**Hierarchy Level** [edit interfaces *interface-name* load-balancing-options member-failure-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Enable the option to redistribute traffic of a failed active member to the other active members.

- For one-to-one (1:1) mobile control plane redundancy, since both members have failed, the traffic is dropped.
- For many-to-one (N:1) high availability support for Network Address Translation (NAT), the traffic for the failed member is automatically redistributed to the other active members.

The remaining statement is explained separately.

NOTE: If you configure the **redistribute-all-traffic** statement, then you cannot configure the **drop-member-traffic** statement; that is, they are mutually exclusive.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Session DPC Redundancy on page 72
- Example: Configuring Broadband Gateway Redundancy on page 78
- member-failure-options (Aggregated Multiservices) on page 709

## rejoin-timeout (Aggregated Multiservices)

**Syntax** rejoin-timeout *rejoin-timeout*;

**Hierarchy Level** [edit interfaces *interface-name* load-balancing-options member-failure-options drop-member-traffic]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the time by when a failed member should rejoin the aggregated multiservices (AMS) interface automatically. If the failed member does not rejoin by the configured time, then the member is moved to the "inactive" state and the traffic meant for this member is dropped.

If the member does not come back online within this time, then it must be manually brought back into the AMS interface, using the **request interface load-balancing revert** command.

**Default** If you do not configure a value, the default value of 120 seconds is used.

**Options** ***rejoin-timeout***—Time, in seconds, by which a failed member must rejoin.

**Default:** 120 seconds

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Session DPC Redundancy on page 72
- **drop-member-traffic (Aggregated Multiservices) on page 694**
- Example: Configuring Broadband Gateway Redundancy on page 78
- **request interface load-balancing revert (Aggregated Multiservices) on page 1130**

## secondary (Aggregated Packet Forwarding Engine)

**Syntax** secondary *anchoring-device-name*;

**Hierarchy Level** [edit interfaces *interface-name* anchoring-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the secondary Flexible PIC Concentrator (FPC) for the anchor Packet Forwarding Engine redundancy. The Packet Forwarding Engine on the secondary FPC acts as the standby (backup) for the Packet Forwarding Engine on the primary FPCs and takes over as the active Packet Forwarding Engine when a Packet Forwarding Engine on a primary FPC fails.

**Options** ***anchoring-device-name***—Name of the FPC.

NOTE: The interface must be a valid interface (fpc-) that is defined in the broadband gateway interface hierarchy.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- anchoring-options (Aggregated Packet Forwarding Engine) on page 691
- Configuring Interface Redundancy on page 74
- Example: Configuring Broadband Gateway Redundancy on page 78

## shared (IPsec)

**Syntax** shared;

**Hierarchy Level** [edit interfaces *interface-name* unit *interface-unit-number* dial-options]

**Release Information** Statement introduced before Junos OS Release 7.4.

**Description** Specify that Dynamic End Point (DEP) IP Security (IPsec) tunnels are supported in shared logical interface (**ifl**) mode for the aggregated multiservices (AMS) interface. In shared **ifl** mode, one AMS **ifl** is shared by multiple DEP IPsec tunnels.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- dedicated (IPsec) on page 693
- dial-options (IPsec) on page 693

## system (MobileNext Broadband Gateway Interfaces)

**Syntax**

```
system {
  pfes {
    [interface interface-name];
  }
  service-pics { #P-GW only
    [interface interface-name];
  }
  session-pics {
    [interface interface-name];
  }
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*],
[edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the different interfaces used to service the subscriber and for anchoring subscriber information in the broadband gateway.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- [edit unified-edge gateways] Hierarchy Level on page 604
- MobileNext Broadband Gateway Chassis Overview on page 60

## unit (Aggregated Multiservices)

**Syntax**

```
unit interface-unit-number {
  dial-options {
    (dedicated | shared);
    ipsec-interface-id ipsec-interface-id;
  }
  family family;
  load-balancing-options {
    preferred-active interface-name;
  }
}
```

**Hierarchy Level** [edit interfaces *interface-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the logical interface on the physical device. You must configure a logical interface to be able to use the physical device.

The remaining statements are explained separately.

**Options** ***interface-unit-number***—Number of the logical unit.

NOTE: **Unit 0 is reserved and cannot be configured under the aggregated multiservices interface (ams).**

**Range:** 1 through 16,384

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Session DPC Redundancy on page 72
- Example: Configuring Broadband Gateway Redundancy on page 78
- **interfaces (Aggregated Multiservices) on page 702**

## warm-standby (Aggregated Packet Forwarding Engine)

**Syntax** warm-standby;

**Hierarchy Level** [edit interfaces *interface-name* anchoring-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the anchor Packet Forwarding Engine redundancy in warm standby mode. In this mode, the secondary Flexible PIC Concentrator (FPC) takes over the role of the primary FPC when a Packet Forwarding Engine on the primary FPC fails. If a Packet Forwarding Engine fails on a primary FPC, then the entire FPC is switched to the secondary FPC.

In warm-standby mode, the subscriber sessions are programmed only after the switchover from the primary FPC to the secondary FPC. Based on the subscriber traffic, the programming for some sessions is expedited if needed.

NOTE: When you configure warm standby mode, the switchover from the secondary FPC to the primary FPC takes place at the FPC level.

**Default** The **warm-standby** mode is the default.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- anchoring-options (Aggregated Packet Forwarding Engine) on page 691
- Configuring Interface Redundancy on page 74
- Example: Configuring Broadband Gateway Redundancy on page 78

CHAPTER 21

# APN Configuration Statements



## APN Services Configuration Statements

## aaa (APN Address Assignment)

**Syntax** aaa;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the address assignment option so that the authentication, authorization, and accounting (AAA) server assigns IP addresses for subscribers. If this option is configured, then the broadband gateway uses the IP address returned by the AAA server as part of the subscriber authentication.

**Default** If you omit the **aaa** statement, the default address assignment option is **local**. This means that the IP addresses are assigned by the broadband gateway using the mobile pool or mobile pool group configured on the access point name (APN). If a pool or a group is not specified, then the default pool is used to assign the IP address. The default mobile pool is configured in the routing instance that is associated with the mobile interface of the APN.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- address-assignment (APN) on page 724
- Enabling Address Assignment by the RADIUS Server on page 199
- Configuring Address Assignment on a Broadband Gateway APN on page 121

## aaa-override (APN Address Assignment)

**Syntax** aaa-override;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment dhcp-proxy-client],
[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment local]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify that the IP address returned by the authentication, authorization, and accounting (AAA) server overrides the address from the subnet returned from the Dynamic Host Configuration Protocol (DHCP) server, or the address obtained from the mobile pool or mobile pool group locally configured on the broadband gateway. If the AAA server provides the address for the user equipment (UE), then the broadband gateway does not assign an address from the subnet, which is returned from the DHCP server for this APN, or the address obtained from the locally configured mobile pool or mobile pool group.

**Default** If you do not configure this statement, then the IP address from the subnet returned from the DHCP server, or the address obtained from the mobile pool or mobile pool group locally configured on the broadband gateway, is used depending on the configuration.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring AAA-Assigned Addresses to Override Locally or DHCP-Assigned Addresses on page 199
- dhcp-proxy-client (APN Address Assignment) on page 746
- local (APN Address Assignment) on page 763

## aaa-profile (APN)

**Syntax** aaa-profile *aaa-profile*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the authentication, authorization, and accounting (AAA) profile to be used for the access point name (APN). The AAA profile is used to authorize whether a default bearer or a primary packet data protocol (PDP) context can be activated for a subscriber. In addition, the AAA profile is also used to pass the subscriber's accounting information to the AAA server.

NOTE: The AAA profiles should already be configured on the broadband gateway.

**Options** ***aaa-profile***—Name of the AAA profile.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring General APN Parameters on the Broadband Gateway on page 115
- Example: Configuring Broadband Gateway APNs on page 134

## address-assignment (APN)

**Syntax**

```
address-assignment {
  aaa;
  allow-static-ip-address {
    no-address-verify;
  }
  dhcp-proxy-client {
    aaa-override;
  }
  dhcpv4-proxy-client-profile {
    logical-system logical-system;
    pool-name pool-name;
    profile-name profile-name;
    routing-instance routing-instance;
  }
  dhcpv6-proxy-client-profile{
    logical-system logical-system;
    pool-name pool-name;
    profile-name profile-name;
    routing-instance routing-instance;
  }
  inet-pool {
    exclude-pools [value];
    group group;
    pool pool;
  }
  inet6-pool {
    exclude-v6pools [value];
    group group;
    pool pool;
  }
  local {
    aaa-override;
  }
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the address assignment parameters for an access point name (APN). These parameters are used by the broadband gateway to assign IP addresses to mobile devices.

The following methods of allocating IP addresses are supported by the broadband gateway:

- AAA—IP addresses are allocated by the authentication, authorization, and accounting (AAA) server.
- DCHP—IP addresses are allocated by the broadband gateway using the IP addresses returned by the Dynamic Host Configuration Protocol (DHCP) server. The broadband gateway uses the information configured in the DHCP proxy client profile to access the IP address returned by the DHCP server.

- Local—IP addresses are allocated by the broadband gateway using a local mobile pool or mobile pool group configured on the APN. If a mobile pool or a mobile pool group is not specified, then the default mobile pool is used to assign the IP address. The default pool is configured in the routing instance that is associated with the mobile interface of the APN.

NOTE: You can configure the address-assignment statement only if the APN type is real.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- address-assignment (MobileNext Broadband Gateway) on page 658
- apns on page 735
- apn-type on page 734
- Configuring Address Assignment on a Broadband Gateway APN on page 121
- Example: Configuring Broadband Gateway APNs on page 134

## allow-network-behind-mobile

**Syntax**
allow-network-behind-mobile;

**Hierarchy Level**
[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information**
Statement introduced in Junos OS Mobility Release 11.4W.

**Description**
Specify that support for network behind mobile is allowed for the access point name (APN). The broadband gateway acts as the IP anchor for devices that are behind the user equipment and forwards traffic to and from these devices

**Default**
If you do not configure this statement, then support for network behind mobile is disabled by default.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Configuring the Networks Behind the Mobile Equipment Feature on page 139
- network-behind-mobile on page 769

## allow-static-ip-address (APN Address Assignment)

**Syntax**

```
allow-static-ip-address {
  no-address-verify;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.

**Description**

Specify that the static IP address provided by the user equipment (UE) is allowed by the broadband gateway. The gateway obtains the IP address of the user equipment from the Create Session Request message.

The remaining statement is explained separately.

**Default**

If you omit the **allow-static-ip-address** statement, then the static IP address provided by the user equipment is not allowed by the broadband gateway.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- address-assignment (APN) on page 724
- Configuring Address Assignment on a Broadband Gateway APN on page 121

## anchor-pfe-ipv4-nbm-prefixes

**Syntax** anchor-pfe-ipv4-nbm-prefixes *maximum-ipv4-prefixes*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the maximum number of IPv4 prefixes (for devices behind the user equipment) allowed for each anchor Packet Forwarding Engine on the MobileNext Broadband Gateway. This configuration allows you to restrict the memory used for IPv4 prefixes (for network behind mobile) in order to prevent the IPv4 prefixes from using the main route memory of the anchor Packet Forwarding Engine.

NOTE: Even if you configure the anchor-pfe-ipv4-nbm-prefixes statement, this does not guarantee that the configured number of IPv4 prefixes will be supported. It is possible that the anchor Packet Forwarding Engine will reject the creation of a prefix due to lack of available memory. If sufficient memory is available, then the anchor Packet Forwarding Engine conforms to the number of prefixes configured.

**Options** ***maximum-ipv4-prefixes***—Maximum number of IPv4 prefixes, in multiples of thousand, per anchor Packet Forwarding Engine.

**Range:** 16 through 128,000 thousand IPv4 prefixes

**Default:** 64,000 IPv4 prefixes

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring the Networks Behind the Mobile Equipment Feature on page 139
- network-behind-mobile on page 769

## anchor-pfe-ipv6-nbm-prefixes

**Syntax** anchor-pfe-ipv6-nbm-prefixes *maximum-ipv6-prefixes*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the maximum number of IPv6 prefixes (for devices behind the user equipment) allowed for each anchor Packet Forwarding Engine on the MobileNext Broadband Gateway. This configuration allows you to restrict the memory used for IPv6 prefixes (for network behind mobile) in order to prevent the IPv6 prefixes from using the main route memory of the anchor Packet Forwarding Engine.

NOTE: Even if you configure the anchor-pfe-ipv6-nbm-prefixes statement, this does not guarantee that the configured number of IPv6 prefixes will be supported. It is possible that the anchor Packet Forwarding Engine will reject the creation of a prefix due to lack of available memory. If sufficient memory is available, then the anchor Packet Forwarding Engine conforms to the number of prefixes configured.

**Options** ***maximum-ipv6-prefixes***—Maximum number of IPv6 prefixes, in multiples of thousand, per anchor Packet Forwarding Engine.

**Range:** 4 through 128,000 IPv6 prefixes

**Default:** 16,000 IPv6 prefixes.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring the Networks Behind the Mobile Equipment Feature on page 139
- network-behind-mobile on page 769

## anonymous-user (APN)

**Syntax**

```
anonymous-user {
  password password;
  (use-apnname | use-imsi | use-msisdn | user-name username);
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure a default username and password for the non-transparent access point name (APN) to authenticate anonymous users who are setting up sessions on the broadband gateway.

When a Create Packet Data Protocol (PDP) Context Request or a Create Session Request message is received for a session without the Protocol Configuration Options (PCO) Password Authentication Protocol (PAP) or Challenge Handshake Authentication Protocol (CHAP) information, the anonymous user options configured for the APN are used for user authentication with the authentication, authorization, and accounting (AAA) server.

If the PCO PAP or CHAP information is included in the Create PDP Context Request or the Create Session Request message received for a session, then the username and password information is obtained from the PCO PAP or CHAP information. This username and password combination overrides the anonymous user options that you configured.

NOTE: The information about the AAA server is obtained from the AAA profile that you specify for the APN.

**Options**

**password** ***password***—Password for user authentication.

**Range:** Up to 32 characters

**use-apnname | use-imsi | use-msisdn | user-name** ***username***—Choose the type of username to be used for anonymous users in the APN.

- **use-apnname**—Use the APN name as the username to authenticate users.
- **use-imsi**—Use the International Mobile Subscriber Identity (IMSI) of the user's device as the username to authenticate users.
- **use-msisdn**—Use the Mobile Station ISDN (MSISDN) number of the user's device as the username to authenticate users.
- ***username***—Default username to be used for authentication.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring Anonymous Users on a Broadband Gateway APN on page 120

## apn-data-type

**Syntax** apn-data-type (ipv4 | ipv4v6 | ipv6);

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the type of addresses (IPv4, IPv6, or both IPv4 and IPv6) that the access point name (APN) can allocate for sessions attaching to the APN.

**Default** If you do not specify a value, the default value is **ipv4**; that is, the APN allocates only IPv4 addresses for sessions attaching to that APN.

**Options**

**ipv4**—Allocate only IPv4 addresses for sessions attaching to the APN.

**ipv4v6**—Allocate both IPv4 or IPv6 addresses (or only an IPv4 or an IPv6 address) for sessions (based on the request) attaching to the APN.

**ipv6**—Allocate only IPv6 addresses for sessions attaching to the APN.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring General APN Parameters on the Broadband Gateway on page 115

## apn-services

**Syntax**

```
apn-services {
  apns {
    [name] {
      aaa-profile aaa-profile;
      address-assignment {
        aaa;
        allow-static-ip-address {
          no-address-verify;
        }
        dhcp-proxy-client {
          aaa-override;
        }
        dhcpv4-proxy-client-profile {
          logical-system logical-system;
          pool-name pool-name;
          profile-name profile-name;
          routing-instance routing-instance;
        }
        dhcpv6-proxy-client-profile{
          logical-system logical-system;
          pool-name pool-name;
          profile-name profile-name;
          routing-instance routing-instance;
        }
        inet-pool {
          exclude-pools [value];
          group group;
          pool pool;
        }
        inet6-pool {
          exclude-v6pools [value];
          group group;
          pool pool;
        }
        local {
          aaa-override;
        }
      }
      allow-network-behind-mobile;
      anonymous-user {
        password password;
        (use-apnname | use-imsi | use-msisdn | user-name username);
      }
      apn-data-type (ipv4 | ipv4v6 | ipv6);
      apn-type (real | virtual | virtual-pre-authenticate);
      block-visitors;
      charging {
        default-profile default-profile;
        home-profile home-profile;
        profile-selection-order [profile-selection-method];
        roamer-profile roamer-profile;
        visitor-profile visited-profile;
```

```
        }
        description description;
        dns-server {
          primary-v4 primary-v4;
          primary-v6 primary-v6;
          secondary-v4 secondary-v4;
          secondary-v6 secondary-v6;
        }
        idle-timeout idle-timeout;
        idle-timeout-direction (both | uplink);
        inter-mobile-traffic {
          (deny | redirect redirect);
        }
        local-policy-profile local-policy-profile;
        maximum-bearers maximum-bearers;
        mobile-interface mobile-interface;
        nbns-server {
          primary-v4 primary-v4;
          secondary-v4 secondary-v4;
        }
        network-behind-mobile {
          imsi imsi {
            prefix-v4 [ipv4-prefix];
            prefix-v6 [ipv6-prefix];
          }
        }
        p-cscf{
          [address];
        }
        restriction-value restriction-value;
        selection-mode {
          (from-ms | from-sgsn | no-subscribed);
        }
        service-mode service-mode-options;
        service-selection-profile service-selection-profile;
        session-timeout session-timeout;
        verify-source-address {
          disable;
        }
        wait-accounting;
      }
    }
  }
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the access point name (APN) selection function for the broadband gateway. The APN selection function determines whether the broadband gateway is responsible for servicing the subscriber. If the gateway is responsible, then the APN selection function selects the Packet Data Network (PDN) service that is applicable for the subscriber. You can configure different parameters related to the device, network, and subscription to provide an enhanced selection function.

The APN selection function determines which APN and service types a Mobile Station (MS) or user equipment (UE) device should use.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- [edit unified-edge gateways ggsn-pgw <gateway-name>] Hierarchy Level on page 604
- Configuring APNs on the MobileNext Broadband Gateway Overview on page 111
- Example: Configuring Broadband Gateway APNs on page 134

## apn-type

**Syntax** apn-type (real | virtual | virtual-pre-authenticate);

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the type of access point name (APN). The following APN types are supported:

- **real**—Configure the APN as **real** if the APN name sent in the GTP Create message will be used for creating the session.
- **virtual**—Configure the APN as **virtual** if the APN name sent in the GTP Create message will be mapped to a different (real) APN. The mapped (real) APN is then used to set up the session. A service selection profile must be configured so that the virtual APN can be mapped to a real APN.
- **virtual-pre-authenticate**—Configure the APN as **virtual-pre-authenticate** if the APN name sent in the GTP Create message will be mapped to a different (real) APN. The mapping in this case is provided by the authentication, authorization, and accounting (AAA) server in the authentication (Access Accept) message. You must configure AAA authentication for this APN so that the virtual APN can be mapped to a real APN.

**Default** If you do not specify a value, the default value is **real**.

**Options** **real**—Specify that the APN is a real APN.

**virtual**—Specify that the APN is a virtual APN.

**virtual-pre-authenticate**—Specify that the APN is a virtual APN that will be mapped to a real APN using AAA authentication.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring General APN Parameters on the Broadband Gateway on page 115

## apns

**Syntax**

```
apns {
  [name] {
    aaa-profile aaa-profile;
    address-assignment {
      aaa;
      allow-static-ip-address {
        no-address-verify;
      }
      dhcp-proxy-client {
        aaa-override;
      }
      dhcpv4-proxy-client-profile {
        logical-system logical-system;
        pool-name pool-name;
        profile-name profile-name;
        routing-instance routing-instance;
      }
      dhcpv6-proxy-client-profile{
        logical-system logical-system;
        pool-name pool-name;
        profile-name profile-name;
        routing-instance routing-instance;
      }
      inet-pool {
        exclude-pools [value];
        group group;
        pool pool;
      }
      inet6-pool {
        exclude-v6pools [value];
        group group;
        pool pool;
      }
      local {
        aaa-override;
      }
    }
    allow-network-behind-mobile;
    anonymous-user {
      password password;
      (use-apnname | use-imsi | use-msisdn | user-name username);
    }
    apn-data-type (ipv4 | ipv4v6 | ipv6);
    apn-type (real | virtual | virtual-pre-authenticate);
    block-visitors;
    charging {
      default-profile default-profile;
      home-profile home-profile;
      profile-selection-order [profile-selection-method];
      roamer-profile roamer-profile;
      visitor-profile visited-profile;
    }
```

```
    description description;
    dns-server {
      primary-v4 primary-v4;
      primary-v6 primary-v6;
      secondary-v4 secondary-v4;
      secondary-v6 secondary-v6;
    }
    idle-timeout idle-timeout;
    idle-timeout-direction (both | uplink);
    inter-mobile-traffic {
      (deny | redirect redirect);
    }
    local-policy-profile local-policy-profile;
    maximum-bearers maximum-bearers;
    mobile-interface mobile-interface;
    nbns-server {
      primary-v4 primary-v4;
      secondary-v4 secondary-v4;
    }
    network-behind-mobile {
      imsi imsi {
        prefix-v4 [ipv4-prefix];
        prefix-v6 [ipv6-prefix];
      }
    }
    p-cscf{
      [address];
    }
    restriction-value restriction-value;
    selection-mode {
      (from-ms | from-sgsn | no-subscribed);
    }
    service-mode service-mode-options;
    service-selection-profile service-selection-profile;
    session-timeout session-timeout;
    verify-source-address {
      disable;
    }
    wait-accounting;
  }
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the access point name (APN) for the broadband gateway. The APN is a unique identifier used by the broadband gateway to identify each attached IP network, which is called an APN network or a Packet Data Network (PDN). The APN determines authorization and address allocation methods, charging rules, several types of timeouts, and various other parameters that characterize the user session to an IP network.

The remaining statements are explained separately.

**Options** *name*—Name of the APN.

**Range:** Up to 100 characters

**Syntax:** Can contain only letters, numbers, decimal points, and dashes

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apn-services on page 731
- Configuring APNs on the MobileNext Broadband Gateway Overview on page 111
- Configuring General APN Parameters on the Broadband Gateway on page 115
- Example: Configuring Broadband Gateway APNs on page 134

## block-visitors

**Syntax** block-visitors;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the access point name (APN) to block visitors who do not belong to the home public land mobile network (HPLMN) from connecting to the APN.

When the broadband gateway receives a Create Session Request message from a subscriber's user equipment (UE), the gateway compares the mobile country code (MCC) and the mobile network code (MNC) in the message with the list of configured MCCs and MNCs for the home PLMN. If the user equipment does not belong to the home PLMN, then the gateway rejects the session and the user equipment is blocked from connecting to the APN.

**Default** If you do not specify a value, the visitors are allowed by default.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring General APN Parameters on the Broadband Gateway on page 115

## count (HTTP Header Enrichment)

**Syntax** count;

**Hierarchy Level** [edit services hcm tag-rule *rule-name* term *term-name* then]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Enable the collection of statistics for the configured term. The collection of statistics for a term is disabled by default.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring HTTP Header Enrichment on page 143
- then (HTTP Header Enrichment) on page 794

## charging (APN)

**Syntax**

```
charging {
  default-profile default-profile;
  home-profile home-profile;
  profile-selection-order [profile-selection-method];
  roamer-profile roamer-profile;
  visitor-profile visited-profile;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the charging profiles for the access point name (APN) that will be used to charge the different types of subscribers who access the APN on the broadband gateway. The **profile-selection-order** configuration indicates the order of preference for the source of the charging profile. If the **profile-selection-order** configuration indicates **static**, then the charging profiles specified are used to charge a subscriber.

NOTE: **The charging profiles must already be configured on the broadband gateway.**

When a subscriber session is created on the APN, a charging profile is applied to the session depending on the type of subscriber (home, visitor, or roamer). The home public land mobile network (HPLMN) configured on the broadband gateway is used to determine the type of subscriber:

- If the subscriber's International Mobile Subscriber Identity (IMSI), mobile country code (MCC), and the mobile network code (MNC) do not match the corresponding values configured for the HPLMN, then the subscriber is deemed a visitor and the **visited-profile** is applied. If the **visited-profile** is not configured, then the **default-profile** is applied.
- If the subscriber's IMSI, MCC, and MNC match the corresponding value configured for the HPLMN, but the subscriber's Routing Area Identity (RAI) does not match the corresponding RAI configured for the HPLMN, then the subscriber is deemed a roamer and the **roamer-profile** is applied. If the **roamer-profile** is not configured, then the **default-profile** is applied.
- If the subscriber is neither a visitor nor a roamer, then the subscriber is deemed a home subscriber and the **home-profile** is applied. If the **home-profile** is not configured, then the **default-profile** is applied.

NOTE: **In the absence of a charging profile from all sources, the subscriber session is created without charging enabled.**

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- charging-profiles on page 824

## default-profile

**Syntax** default-profile *default-profile*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* charging], [edit unified-edge gateways sgw *gateway-name* charging global-profile]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging global-profile]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the default profile. If the **profile-selection-order** configuration indicates **static**, and if the corresponding charging profile applicable to the type of subscriber (home, visitor, or roamer) has not been specified, then the default profile is applied.

NOTE: The charging profile must already be configured on the broadband gateway.

The broadband gateway determines the type of subscriber by using the mobile country code (MCC) and the mobile network code (MNC) values in the Create Session Request message from the subscriber's user equipment (UE) and compares these with the corresponding values configured for the home public land mobile network (HPLMN). Depending on whether a subscriber is a home subscriber, a visitor, or a roamer, the **home-profile**, **visited-profile**, or **roamer-profile** is applied. If the applicable profile is not configured, then the **default-profile**, if configured, is applied. If the **default-profile** is also not configured, then the subscriber session is created with no charging applied.

**Options** ***default-profile***—Name of the default profile.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- charging (APN) on page 739
- charging-profiles on page 824
- global-profile (Serving Gateway) on page 851

## description (APN)

**Syntax** description *description*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Enter a description for the access point name (APN).

**Options** ***description***—Description of the APN.
**Range:** Up to 80 characters

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- apns on page 735
- Configuring General APN Parameters on the Broadband Gateway on page 115

## destination-address (HTTP Header Enrichment)

**Syntax**
```
destination-address {
   (any-unicast | any-unicast except);
   [(prefix | prefix except)];
}
```

**Hierarchy Level** [edit services hcm tag-rule *rule-name* term *term-name* from]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the IP address to which to apply the HTTP header extension information.

Once this criteria and the other match criteria specified for term are matched, then the actions specified for the term are applied.

**Options** **any-unicast**—Specify that any unicast address is matched.

**any-unicast except**—Specify that all addresses except unicast addresses are matched.

***prefix***—Specify the IP prefix for the addresses that are matched.

***prefix* except**—Specify that the addresses except the ones specified in the IP prefix are matched.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**
- Configuring HTTP Header Enrichment on page 143
- from (HTTP Header Enrichment) on page 753

## destination-address-range (HTTP Header Enrichment)

**Syntax**

```
destination-address-range {
  [high address low address] [except];
}
```

**Hierarchy Level** [edit services hcm tag-rule *rule-name* term *term-name* from]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the destination IP address range to which HTTP header enrichment is applied. You can specify multiple address ranges by including the **destination-address-range** statement multiple times.

**Options**

**high *address***—Upper limit of the address range.

**low *address***—Lower limit of the address range.

**except**—Specify that addresses that are not in the specified address range are matched.

**Required Privilege Level**
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring HTTP Header Enrichment on page 143
- from (HTTP Header Enrichment) on page 753

## destination-port-range (HTTP Header Enrichment)

**Syntax**

```
destination-port-range {
  [high port-number low port-number];
}
```

**Hierarchy Level** [edit services hcm tag-rule *rule-name* term *term-name* from]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the destination port range to which the HTTP header enrichment is applied. You can specify multiple port ranges by including the **destination-port-range** statement multiple times.

**Options**

**high *port-number***—Upper limit of the port range.

**low *port-number***—Lower limit of the port range.

**Required Privilege Level**
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring HTTP Header Enrichment on page 143
- from (HTTP Header Enrichment) on page 753

## destination-ports (HTTP Header Enrichment)

**Syntax** destination-ports [*value*];

**Hierarchy Level** [edit services hcm tag-rule *rule-name* term *term-name* from]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the destination ports to which the HTTP header enrichment is applied. You can specify multiple ports by including the **destination-ports** statement multiple times.

**Options** ***value***—Port number.

**Range:** 0 through 65,535

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring HTTP Header Enrichment on page 143
- from (HTTP Header Enrichment) on page 753

## destination-prefix-list (HTTP Header Enrichment)

**Syntax**

```
destination-prefix-list {
  [(prefix-name | prefix-name except)];
}
```

**Hierarchy Level** [edit services hcm tag-rule *rule-name* term *term-name* from]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the destination prefix list to which the HTTP header enrichment is applied. You can specify multiple prefix lists by including the **destination-prefix-list** statement multiple times.

**Options** ***prefix-name***—Name of the prefix list.

NOTE: **The prefix list must already be defined at the [edit policy-options prefix-list] hierarchy level.**

***prefix-name* except**—Specify that the destination addresses not in the specified prefix list are matched.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring HTTP Header Enrichment on page 143
- from (HTTP Header Enrichment) on page 753

## dhcp-proxy-client (APN Address Assignment)

**Syntax**

```
dhcp-proxy-client {
  aaa-override;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.

**Description**

Configure the address assignment option so that the IP subnet returned by the Dynamic Host Configuration Protocol (DHCP) server is used by the broadband gateway when it assigns IP addresses for subscribers. If this option is configured, then you must configure a DHCP (IPv4 or IPv6) proxy client profile on the broadband gateway. The broadband gateway uses the information configured in the DHCP proxy client profile to obtain the IP subnet returned by the DHCP server.

The remaining statements are explained separately.

**Default**

If you omit the **dhcp-proxy-client** statement, the default address assignment option is **local**. This means that the IP addresses are assigned by the broadband gateway using the mobile pool or mobile pool group configured on the APN. If a mobile pool or a mobile pool group is not specified, then the default mobile pool is used to assign the IP address. The default mobile pool is configured on the routing instance that is associated with the mobile interface of the APN.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- address-assignment (APN) on page 724
- Configuring Address Assignment on a Broadband Gateway APN on page 121
- Example: Configuring Broadband Gateway APNs on page 134

## dhcpv4-proxy-client-profile (APN Address Assignment)

**Syntax**

```
dhcpv4-proxy-client-profile {
  logical-system logical-system;
  pool-name pool-name;
  profile-name profile-name;
  routing-instance routing-instance;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.

**Description**

Configure the Dynamic Host Configuration Protocol (DHCP) IPv4 proxy client profile for the access point name (APN). The broadband gateway uses the DHCP proxy client profile to obtain the subnet or the prefix from the DHCP server for the APN. The subnet or the prefix is managed locally and a single IP address is provided to the user equipment (UE) in the Create Session Response message.

NOTE: If you selected **dhcp-proxy-client** as the mode of address assignment for the broadband gateway, then you must configure a DHCP (IPv4 or IPv6) proxy client profile.

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- address-assignment (APN) on page 724
- Configuring DHCP Under APN on page 217
- Configuring Address Assignment on a Broadband Gateway APN on page 121

## dhcpv6-proxy-client-profile (APN Address Assignment)

**Syntax**

```
dhcpv6-proxy-client-profile {
  logical-system logical-system;
  pool-name pool-name;
  profile-name profile-name;
  routing-instance routing-instance;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.

**Description**

Configure the Dynamic Host Configuration Protocol (DHCP) IPv6 proxy client profile for the access point name (APN). The broadband gateway uses the DHCP proxy client profile to obtain the subnet or the prefix from the DHCP server for the APN. The subnet or the prefix is managed locally and a single IP address is provided to the user equipment (UE) in the Create Session Response message.

NOTE: If you selected **dhcp-proxy-client** as the mode of address assignment for the broadband gateway, then you must configure a DHCP (IPv4 or IPv6) proxy client profile.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- address-assignment (APN) on page 724
- Configuring DHCP Under APN on page 217
- Configuring Address Assignment on a Broadband Gateway APN on page 121

## dns-server (APN)

**Syntax**

```
dns-server {
  primary-v4 primary-v4;
  primary-v6 primary-v6;
  secondary-v4 secondary-v4;
  secondary-v6 secondary-v6;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the IP addresses of the Domain Name System (DNS) servers for the access point name (APN).

During the creation of a session, the user equipment (UE) may request the broadband gateway for the DNS server address. Typically, the gateway obtains this information from the authentication, authorization, and accounting (AAA) server. If the DNS server address is not available from the AAA server, then the gateway sends the DNS server addresses configured for the APN to the user equipment.

**Options**

**primary-v4 *primary-v4***—IPv4 address of the primary DNS server.

**primary-v6 *primary-v6***—IPv6 address of the primary DNS server.

**secondary-v4 *secondary-v4***—IPv4 address of the secondary DNS server.

**secondary-v6 *secondary-v6***—IPv6 address of the secondary DNS server.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring General APN Parameters on the Broadband Gateway on page 115

## encrypt (HTTP Header Enrichment)

**Syntax**

```
encrypt {
  hash algorithm;
  prefix hash-prefix;
}
```

**Hierarchy Level** [edit services hcm tag-rule *rule-name* term *term-name* then tag *tag-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the transform to be applied to the header for the HTTP header enrichment. This allows subscriber attributes to be added in a way that is obscured from the user.

NOTE: If you include this statement, then you also must configure hash and prefix statements.

**Options**

**hash *algorithm***—Specify the hashing algorithm. Currently, only **md5** is supported.

**prefix *hash-prefix***—Specify the prefix key (up to 63 characters). The prefix key is concatenated with the specified tag attribute and hashed. The resulting hash value is then inserted into the HTTP header.

**Required Privilege Level**

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring HTTP Header Enrichment on page 143
- tag (HTTP Header Enrichment) on page 786

## exclude-pools (APN Address Assignment)

**Syntax** exclude-pools [*value*];

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment inet-pool]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the IPv4 mobile pools to exclude from the specified mobile pool group for this access point name (APN). The IP addresses in the excluded mobile pools are not used by the broadband gateway during IP address assignment to subscribers.

NOTE: This configuration is valid only when you specify a mobile pool group for the APN.

**Options** *value*—Name of the mobile pool to exclude.

To specify multiple mobile pools to exclude, include the **exclude-pools** statement multiple times.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Address Assignment on a Broadband Gateway APN on page 121
- inet-pool (APN Address Assignment) on page 760

## exclude-v6pools (APN Address Assignment)

**Syntax** exclude-v6pools [*value*];

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment inet6-pool]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the IPv6 mobile pools to exclude from the specified mobile pool group for this access point name (APN). The IP addresses in excluded mobile pools are not used by the broadband gateway during IP address assignment to subscribers.

NOTE: This configuration is valid only when you specify a mobile pool group for the APN.

**Options** *value*—Name of the mobile pool to exclude.

To specify multiple mobile pools to exclude, include the **exclude-v6pools** statement multiple times.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Address Assignment on a Broadband Gateway APN on page 121
- inet6-pool (APN Address Assignment) on page 761

## from (HTTP Header Enrichment)

**Syntax**

```
from {
  destination-address {
    (any-unicast | any-unicast except);
    [prefix];
  }
  destination-address-range {
    [high address low address] [except];
  }
  destination-port-range {
    [high port-number low port-number];
  }
  destination-ports [value];
  destination-prefix-list {
    (prefix-name | prefix-name except);
  }
}
```

**Hierarchy Level** [edit services hcm tag-rule *rule-name* term *term-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the match criteria for the term. If all the conditions specified in the match criteria are met, then the actions specified in the **then** statement are applied.

NOTE: You must configure this statement and include at least one match criterion.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring HTTP Header Enrichment on page 143
- term (HTTP Header Enrichment) on page 793

## group (APN Address Assignment)

**Syntax** group *group*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment inet-pool],
[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment inet6-pool]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify a previously configured mobile pool group (IPv4 or IPv6) for the access point name (APN). The broadband gateway uses the mobile pool group to assign IP addresses locally to subscribers.

NOTE: You can specify either a mobile pool group or a mobile pool, but not both.

**Default** If neither a mobile pool nor mobile group is specified, then the default mobile pool is used to assign the IP address. The default mobile pool is configured in the routing instance that is associated with the mobile interface of the APN.

**Options** *group*—Name of the mobile pool group.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Address Assignment on a Broadband Gateway APN on page 121
- inet-pool (APN Address Assignment) on page 760
- inet6-pool (APN Address Assignment) on page 761
- mobile-pool-groups on page 664

## hcm (HTTP Header Enrichment)

**Syntax**

```
hcm {
  tag-attribute [attr-name];
  tag-rule rule-name {
    term term-name {
      from {
        destination-address {
          (any-unicast | any-unicast except);
          [prefix];
        }
        destination-address-range {
          [high address low address] [except];
        }
        destination-port-range {
          [high port-number low port-number];
        }
        destination-ports [value];
        destination-prefix-list {
          (prefix-name | prefix-name except);
        }
      }
      then{
        count;
        tag tag-name {
          encrypt {
            hash algorithm;
            prefix hash-prefix;
          }
          tag-attribute tag-attr-name;
          tag-header header;
          tag-separator separator;
        }
      }
    }
  }
  tag-rule-set rule-set-name {
    [rule rule-name];
  }
}
```

**Hierarchy Level** [edit services]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the parameters required to support Hypertext Transfer Protocol (HTTP) header enrichment on the broadband gateway.

The broadband gateway can support content added to the HTTP headers sent back and forth as part of the client-server exchange for mobile subscribers accessing Web-based services. You configure HTTP header enrichment as a service for an access point name (APN).

The remaining statements are explained separately.

**Required Privilege Level**
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**
- [edit services hcm] Hierarchy Level on page 598
- Configuring HTTP Header Enrichment on page 143

## home-profile

**Syntax**
home-profile *home-profile*;

**Hierarchy Level**
[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* charging],
[edit unified-edge gateways sgw *gateway-name* charging global-profile]

**Release Information**
Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging global-profile]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**
Specify the profile that should be used to charge home subscribers. If the **profile-selection-order** configuration indicates **static**, then this profile is used for home subscribers.

NOTE: **The charging profile must already be configured on the broadband gateway.**

The broadband gateway determines whether the subscriber is a home subscriber by using the mobile country code (MCC) and the mobile network code (MNC) values in the Create Session Request message from the subscriber's user equipment (UE). If the subscriber's International Mobile Subscriber Identity (IMSI), MCC, and MNC belong to the same PLMN to which both the GGSN or P-GW and the S-GW belong, then the subscriber is deemed a home subscriber and the **home-profile** is applied. If the **home-profile** is not configured, then the **default-profile**, if configured, is applied. If the **default-profile** is also not configured, then the subscriber session is created with no charging applied.

**Options**
***home-profile***—Name of the home profile.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- charging (APN) on page 739
- charging-profiles on page 824
- global-profile (Serving Gateway) on page 851

## idle-timeout (APN)

**Syntax** idle-timeout *idle-timeout*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the idle timeout for the access point name (APN). The idle timeout is the duration that the packet data protocol (PDP) context or bearer waits to receive a data packet before timing out. After the idle timeout expires, the broadband gateway takes down the PDP context or bearer. Setting the idle timeout ensures that if no data is being sent for the duration specified, then the PDP context and bearers can be taken down, and the gateway's resources can be freed.

**Options** ***idle-timeout***—Idle timeout for the APN.

**Range:** 0 through 300 minutes

**Default:** 0 minutes indicates that idle timeout will not be detected. PDP contexts or bearers will remain active indefinitely even if there is no data being transmitted.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring General APN Parameters on the Broadband Gateway on page 115
- idle-timeout-direction (APN) on page 758

## idle-timeout-direction (APN)

**Syntax** idle-timeout-direction (both | uplink);

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the direction of the traffic (uplink or both uplink and downlink) to be considered for idle timeout for the access point name (APN).

NOTE: The **idle-timeout-direction** is applicable only if you have configured an *idle-timeout* value.

**Default** If you do not specify an option, **both** is considered the default timeout direction; that is, the idle period is detected in both the uplink and downlink direction.

**Options** **both**—Detect the idle periods for data traffic flowing in both uplink and downlink directions.

**uplink**—Detect the idle periods for data traffic flowing only in the uplink direction.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring General APN Parameters on the Broadband Gateway on page 115
- idle-timeout (APN) on page 757

## imsi (Network Behind Mobile)

**Syntax**

```
imsi imsi {
  prefix-v4 [ipv4-prefix];
  prefix-v6 [ipv6-prefix];
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* network-behind-mobile]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.4W.

**Description**

Specify the International Mobile Subscriber Identity (IMSI) of the user equipment (UE). The broadband gateway uses the IMSI to map the configured prefixes to a GPRS tunneling protocol (GTP) tunnel and forwards the traffic to the devices behind the user equipment.

NOTE: If you configure the **imsi** statement, you must specify either the IPv4 prefix, the IPv6 prefix, or both prefixes.

The remaining statements are explained separately.

**Options**

*imsi*—IMSI of the user equipment.

To configure multiple IMSIs, include the **imsi** statement multiple times.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring the Networks Behind the Mobile Equipment Feature on page 139
- network-behind-mobile on page 769

## inet-pool (APN Address Assignment)

**Syntax**

```
inet-pool {
  exclude-pools [value];
  group group;
  pool pool;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.

**Description**

Specify the IPv4 mobile pool or mobile pool group that will be used by the broadband gateway to assign IP addresses locally to subscribers. If you specify a mobile pool group, you can also configure a set of mobile pools to be excluded from the access point name (APN).

You configure the **inet-pool** if you selected **local** as the mode of address assignment for the broadband gateway.

NOTE: **You can specify either a mobile pool group or a mobile pool, but not both.**

The remaining statements are explained separately.

**Default**

If neither a mobile pool nor a mobile group is specified, then the default mobile pool is used to assign the IP address. The default mobile pool is configured in the routing instance that is associated with the mobile interface of the APN.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- address-assignment (APN) on page 724
- Configuring Address Assignment on a Broadband Gateway APN on page 121

## inet6-pool (APN Address Assignment)

**Syntax**

```
inet6-pool {
  exclude-v6pools [value];
  group group;
  pool pool;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.

**Description**

Specify the IPv6 mobile pool or mobile pool group that will be used by the broadband gateway to assign IP addresses locally to subscribers. If you specify a mobile pool group, you can also configure a set of mobile pools to be excluded from the access point name (APN).

You configure the **inet6-pool** if you selected **local** as the mode of address assignment for the broadband gateway.

NOTE: **You can specify either a mobile pool group or a mobile pool, but not both.**

The remaining statements are explained separately.

**Default**

If neither a mobile pool nor mobile group is specified, then the default mobile pool is used to assign the IP address. The default mobile pool is configured in the routing instance that is associated with the mobile interface of the APN.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- address-assignment (APN) on page 724
- Configuring Address Assignment on a Broadband Gateway APN on page 121

## inter-mobile-traffic (APN)

**Syntax**

```
inter-mobile-traffic {
   (deny | redirect redirect);
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the inter-mobile traffic options for the access point name (APN).

Inter-mobile traffic refers to the traffic between two user equipment (UE) that are anchored on the broadband gateway. You can either deny inter-mobile traffic, which means that the gateway will drop the inter-mobile traffic, or redirect the inter-mobile traffic through the configured IP address.

**Options** **deny**—Do not allow inter-mobile traffic.

**redirect *redirect***—IPv4 address to which the inter-mobile traffic should be redirected.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring General APN Parameters on the Broadband Gateway on page 115

## local (APN Address Assignment)

**Syntax**

```
local {
  aaa-override;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.

**Description**

Configure the address assignment option so that the broadband gateway assigns IP addresses locally to subscribers. The gateway assigns addresses using the mobile pool or mobile pool group previously configured on the access point name (APN).

NOTE: An APN can have a mobile pool or a mobile pool group configured, but not both.

The remaining statement is explained separately.

**Default**

If you do not specify any option, the default address assignment option is **local**. If a mobile pool or a mobile pool group is not specified, then the default mobile pool is used to assign the IP address. The default mobile pool is configured in the routing instance that is associated with the mobile interface of the APN.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- address-assignment (APN) on page 724
- Configuring AAA-Assigned Addresses to Override Locally or DHCP-Assigned Addresses on page 199

## local-policy-profile (APN)

**Syntax** local-policy-profile *local-policy-profile*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify a local policy for the access point name (APN) on the broadband gateway. The local policy is a combination of the quality-of-service (QoS) policy (**cos-policy-profile**), the classifier policy (**classifier-profile**), and the resource threshold policy (**resource-threshold-policy**). The local policy specified for the APN takes precedence over the one specified for the gateway.

NOTE: **The local-policy-profile must already be configured at the [edit unified-edge] hierarchy level.**

**Default** If you do not specify a local policy for the APN, then the local policy specified for the gateway is applied.

**Options** ***local-policy-profile***—Name of local policy profile.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- local-policy-profile (Broadband Gateway) on page 940

## logical-system (APN Address Assignment)

**Syntax** logical-system *logical-system*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment dhcpv4-proxy-client-profile],
[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment dhcpv6-proxy-client-profile]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the logical system where the Dynamic Host Configuration Protocol (DHCP) proxy client profile (IPv4 or IPv6) is defined.

**Default** If you do not configure this statement, then the default logical system configured is used.

**Options** ***logical-system***—Name of the logical system where the DHCP proxy client profile is defined.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring DHCP Under APN on page 217
- Configuring Address Assignment on a Broadband Gateway APN on page 121
- **dhcpv4-proxy-client-profile (APN Address Assignment) on page 747**
- **dhcpv6-proxy-client-profile (APN Address Assignment) on page 748**

## maximum-bearers (APN)

**Syntax** maximum-bearers *maximum-bearers*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the maximum number of bearers or packet data protocol (PDP) contexts allowed for the access point name (APN). The maximum number of bearers specified for the APN takes precedence over the corresponding value specified for the gateway.

**Default** If you do not configure the **maximum-bearers** for the APN, then the maximum bearers allowed for the APN is limited by the **maximum-bearers** configured for the gateway.

**Options** ***maximum-bearers***—Maximum number of bearers for the APN.

**Range:** 100,000 through 12,000,000 bearers

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring General APN Parameters on the Broadband Gateway on page 115
- Configuring the Maximum Number of Bearers on page 334
- maximum-bearers (Broadband Gateway) on page 944

## mobile-interface (APN)

**Syntax** mobile-interface *mobile-interface*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the mobile interface for the access point name (APN).

NOTE: You can configure the **mobile-interface** statement only if the APN type is **real**.

A class of subscribers is represented by a logical interface (**ifl**) template. This logical interface template is configured in the mobile interface (**interfaces mif**) hierarchy level. The APN is associated with the mobile logical interface (**mif**) template through this configuration. Therefore, all subscribers in this APN will execute the common features, such as a firewall, in the **mobile-ifl** context.

NOTE: The configuration of a mobile interface is mandatory.

**Options** *mobile-interface*—Mobile interface name.

NOTE: The interface must be defined as a mobile interface (**mif-**) in the broadband gateway interface hierarchy.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- apn-type on page 734
- Configuring General APN Parameters on the Broadband Gateway on page 115
- Configuring Mobile Interfaces for APNs on page 126
- interfaces (Mobile Interface) on page 1065

## nbns-server (APN)

**Syntax**

```
nbns-server {
  primary-v4 primary-v4;
  secondary-v4 secondary-v4;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the NetBIOS name server (NBNS) servers for the access point name (APN).

During the creation of a session, the user equipment (UE) may request the NBNS server address from the broadband gateway. Typically, the gateway obtains this information from the authentication, authorization, and accounting (AAA) server. If the NBNS server address is not available from the AAA server, the gateway sends the NBNS server addresses configured for the APN to the user equipment.

**Options** **primary-v4 *primary-v4***—IPv4 address of the primary NBNS server.

**secondary-v4 *secondary-v4***—IPv4 address of the secondary NBNS server.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring General APN Parameters on the Broadband Gateway on page 115

## network-behind-mobile

**Syntax**

```
network-behind-mobile {
  imsi imsi {
    prefix-v4 [ipv4-prefix];
    prefix-v6 [ipv6-prefix];
  }
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the configuration for network behind mobile for the access point name (APN). The broadband gateway acts as the IP anchor for devices that are behind the user equipment and forwards traffic to and from these devices. The broadband gateway determines the network prefixes or IP addresses for the devices behind the user equipment either from the prefixes configured for the APN or from the Access Accept messages from the authentication, authorization, and accounting (AAA) server.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- allow-network-behind-mobile on page 725
- Configuring the Networks Behind the Mobile Equipment Feature on page 139

## no-address-verify (APN Address Assignment)

**Syntax**

```
no-address-verify;
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment allow-static-ip-address]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify that the static IP address provided by the user equipment (UE) is not verified by the broadband gateway.

**Default** If you omit the **no-address-verify** statement, then the static IP address provided by the user equipment is verified with the authentication, authorization, and accounting (AAA) server during the authentication phase.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- allow-static-ip-address (APN Address Assignment) on page 726
- Configuring Address Assignment on a Broadband Gateway APN on page 121

## p-cscf (APN)

**Syntax**

```
p-cscf {
   [address];
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the IPv4 or IPv6 address of the proxy-call session control function (P-CSCF) server, which is used for IP Multimedia Subsystem (IMS) calls.

During the creation of a session, the user equipment (UE) can request the P-CSCF server's address from the broadband gateway. Typically, the gateway obtains this information from the authentication, authorization, and accounting (AAA) server. If the P-CSCF server's address is not available from the AAA server, the gateway sends the P-CSCF server's address configured for the APN to the user equipment.

**Options** ***address***—IP address (IPv4 and/or IPv6) of the P-CSCF server.

To specify multiple addresses, include the **p-cscf** statement multiple times.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring General APN Parameters on the Broadband Gateway on page 115

## prefix-v4 (Network Behind Mobile)

**Syntax** prefix-v4 [*ipv4-prefix*];

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* network-behind-mobile imsi *imsi*]

**Description** Configure the IPv4 prefixes for the devices behind the user equipment.

NOTE:

- If you configure the **imsi** statement, you must specify either the IPv4 prefix, the IPv6 prefix, or both prefixes.
- You can configure maximum of 32 prefixes (only IPv4, only IPv6, or both IPv4 and IPv6).
- By default, the IPv4 prefixes configured using this statement take precedence over the information returned by the authentication, authorization, and accounting (AAA) server. However, if the access point name's address assignment is configured to use the local pool and if the **aaa-override** statement is also specified, then the prefixes configured using this statement are overwritten by the information obtained from the AAA server.

**Options** ***ipv4-prefix***—IPv4 prefix of the device.

To configure multiple IPv4 prefixes, include the **prefix-v4** statement multiple times.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring the Networks Behind the Mobile Equipment Feature on page 139
- imsi (Network Behind Mobile) on page 759

## prefix-v6 (Network Behind Mobile)

**Syntax** prefix-v6 [*ipv6-prefix*];

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* network-behind-mobile imsi *imsi*]

**Description** Configure the IPv6 prefixes for the devices behind the user equipment. The MobileNext Broadband Gateway uses these prefixes to forward traffic to and from the devices behind the user equipment.

NOTE:

- If you configure the **imsi** statement, you must specify either the IPv4 prefix, the IPv6 prefix, or both prefixes.
- You can configure maximum of 32 prefixes (only IPv4, only IPv6, or both IPv4 and IPv6).
- By default, the IPv6 prefixes configured using this statement take precedence over the information returned by the authentication, authorization, and accounting (AAA) server. However, if the access point name's address assignment is configured to use the local pool and if the **aaa-override** statement is also specified, then the prefixes configured using this statement are overwritten by the information obtained from the AAA server.

**Options** ***ipv6-prefix***—IPv6 prefix of the device.

To configure multiple IPv6 prefixes, include the **prefix-v6** statement multiple times.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring the Networks Behind the Mobile Equipment Feature on page 139
- imsi (Network Behind Mobile) on page 759

## pool (APN Address Assignment)

**Syntax** pool *pool*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment inet-pool],
[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment inet6-pool]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify a mobile pool (IPv4 or IPv6) for the access point name (APN). The broadband gateway uses the mobile pool to assign IP addresses locally to subscribers. The mobile pool that you specify must already be configured on the broadband gateway.

NOTE: **You can specify either a mobile pool or a mobile pool group, but not both.**

**Default** If neither a mobile pool nor mobile group is specified, then the default mobile pool is used to assign the IP address. The default mobile pool is configured in the routing instance that is associated with the mobile interface of the APN.

**Options** ***pool***—Name of the pool.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Address Assignment on a Broadband Gateway APN on page 121
- inet-pool (APN Address Assignment) on page 760
- inet6-pool (APN Address Assignment) on page 761
- mobile-pools on page 665

## pool-name (APN Address Assignment)

**Syntax** pool-name *pool-name*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment dhcpv4-proxy-client-profile],
[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment dhcpv6-proxy-client-profile]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the name of the pool to be sent to the Dynamic Host Configuration Protocol (DHCP) server. The DHCP server returns a subnet for the access point name (APN) from the specified pool. This parameter is optional.

**Options** ***pool-name***—Name of the pool to be sent to the DHCP server.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring DHCP Under APN on page 217
- Configuring Address Assignment on a Broadband Gateway APN on page 121
- **dhcpv4-proxy-client-profile (APN Address Assignment) on page 747**
- **dhcpv6-proxy-client-profile (APN Address Assignment) on page 748**

## profile-name (APN Address Assignment)

**Syntax** profile-name *profile-name*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment dhcpv4-proxy-client-profile],
[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment dhcpv6-proxy-client-profile]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the Dynamic Host Configuration Protocol (DHCP) proxy client profile (IPv4 or the IPv6) for the access point name (APN). The profile name under a specific or the default logical system, and a specific or the default routing instance are used when the gateway requests the DHCP server for subnets for the APN.

NOTE: The proxy client profile must be previously configured on the broadband gateway. This configuration is done when you configure address pools for mobile subscribers.

**Options** ***profile-name***—Name of the DHCP proxy client profile.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring DHCP Under APN on page 217
- Configuring Address Assignment on a Broadband Gateway APN on page 121
- dhcpv4-proxy-client-profile (APN Address Assignment) on page 747
- dhcpv6-proxy-client-profile (APN Address Assignment) on page 748
- mobile-pools on page 665

## profile-selection-order (APN)

**Syntax** profile-selection-order [*profile-selection-method*];

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* charging]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the order of the methods used to select a charging profile applicable for a subscriber's session. You can specify a maximum of three profile selection methods—**radius**, **static**, or **serving**. If the first choice is not available, then the next choice is considered, and so on.

For example, consider a scenario where the profile selection order is **radius**, **serving**, and **static**. Since **radius** is the first choice, the charging profile provided by the authentication, authorization, and accounting (AAA) server will be used. If the AAA server does not provide a charging profile ID in the Authentication Accept message, then the next choice (**serving**) is considered. If the Serving GPRS Support Node (SGSN) does not provide a charging profile ID in the charging characteristics information element (IE) within the GPRS tunneling protocol (GTP) Create Session message, then the next choice (**static**) is considered. With the **static** option, the charging profiles that you specified on the access point name (APN) are used to charge the subscriber based on subscriber's status (home, visitor, or roamer).

NOTE: If the charging profile cannot be selected by any of the methods specified, then charging is disabled for that subscriber.

**Options** ***profile-selection-method***—One or more profile selection methods, listed in the order in which they should be tried. The method can be one or more of the following:

- **radius**—Use the charging profile sent by the AAA server.
- **serving**—Use the charging profile sent by the SGSN or the Serving Gateway (S-GW).
- **static**—Use the charging profile configured locally for the APN on the broadband gateway.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- charging (APN) on page 739

## restriction-value (APN)

**Syntax** restriction-value *restriction-value*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the restriction value for the access point name (APN) based on the applications allowed on this APN and on other APNs configured on the broadband gateway. When you configure a restriction value for an APN, the restriction value determines the traffic that can be sent by a subscriber on that APN to other APNs. For example, subscribers cannot send Wireless Application Protocol (WAP) or Multimedia Messaging Service (MMS) messages to subscribers on an APN that does not support MMS or WAP.

Table 57 on page 777 displays the valid restriction values that you can configure.

### Table 57: Valid Restriction Values for APNs

| Maximum APN Restriction Value | Type of APN | Application Example | Allowed Restriction Values on Other APNs |
|---|---|---|---|
| 0 | Not applicable (no restriction) | Not applicable (no restriction) | All |
| 1 | Public Type 1 | WAP or MMS | 1,2, or 3 |
| 2 | Public Type 1 | Internet or other Packet Data Network (PDN) | 1 or 2 |
| 3 | Private Type 1 | Corporate network MMS | 1 |
| 4 | Private Type 2 | Corporate network without MMS | None |

**Options** ***restriction-value***—Restriction value for the APN.

**Range:** 0 through 4

**Default:** 0 indicates that there are no restrictions on the traffic sent from one APN to another.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring the Restriction Value on a Broadband Gateway APN on page 119

## roamer-profile

**Syntax** roamer-profile *roamer-profile*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* charging], [edit unified-edge gateways sgw *gateway-name* charging global-profile]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging global-profile]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the profile that should be used to charge roaming subscribers. If the **profile-selection-order** configuration indicates **static**, then this profile is used for roaming subscribers.

NOTE: **The charging profile must already be configured on the broadband gateway.**

The broadband gateway determines whether the subscriber is a roamer by using the mobile country code (MCC) and the mobile network code (MNC) values in the Create Session Request message from the subscriber's user equipment (UE). If the subscriber's International Mobile Subscriber Identity (IMSI), MCC, and MNC belong to the same PLMN as the GGSN or P-GW, but the S-GW belongs to a different PLMN, then the subscriber is deemed a roamer and the **roamer-profile** is applied. If the **roamer-profile** is not configured, then the **default-profile**, if configured, is applied. If the **default-profile** is also not configured, then the subscriber session is created with no charging applied.

**Options** ***roamer-profile***—Name of the roamer profile.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- **charging (APN) on page 739**
- **charging-profiles on page 824**
- **global-profile (Serving Gateway) on page 851**

## routing-instance (APN Address Assignment)

**Syntax** routing-instance *routing-instance*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment dhcpv4-proxy-client-profile],
[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* address-assignment dhcpv6-proxy-client-profile]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the routing instance where the Dynamic Host Configuration Protocol (DHCP) proxy client profile (IPv4 or IPv6) is defined.

**Default** If you do not configure this statement, then the default routing instance configured is used.

**Options** ***routing-instance***—Routing instance where the DHCP proxy client profile is defined.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring DHCP Under APN on page 217
- Configuring Address Assignment on a Broadband Gateway APN on page 121
- **dhcpv4-proxy-client-profile (APN Address Assignment) on page 747**
- **dhcpv6-proxy-client-profile (APN Address Assignment) on page 748**

## rule (Tag Rule Set)

**Syntax** [rule *rule-name*];

**Hierarchy Level** [edit services hcm tag-rule-set]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the tag rule that should be a part of the tag rule set.

NOTE: The tag rule must already be defined at the **[edit services hcm]** hierarchy level.

**Options** *rule-name*—Name of the tag rule.

To specify multiple tag rules, include the **rule** statement multiple times.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring HTTP Header Enrichment on page 143
- **tag-rule-set (HTTP Header Enrichment) on page 791**

## selection-mode (APN)

**Syntax**

```
selection-mode {
  (from-ms | from-sgsn | no-subscribed);
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the access point name (APN) to support the use of the Selection Mode information element (IE) in the Create Session Request or the Create Packet Data Protocol (PDP) Context message. The broadband gateway accepts or rejects the activation of the bearer or the PDP context depending on the **selection-mode** configured. Table 58 on page 781 displays the selection mode IE values and their descriptions.

The following selection mode options can be configured for the APN:

- **from-ms**—If you configure this option, then the broadband gateway allows the Create Session Request or Create PDP Context message with the selection mode IE value of 1.
- **from-sgsn**—If you configure this option, then the broadband gateway allows the Create Session Request or Create PDP Context message with the selection mode IE value of 2 or 3.
- **no-subscribed**—If you configure this option, then the broadband gateway rejects the Create Session Request or Create PDP Context message with the selection mode IE value of 0.

### Table 58: Selection Mode Values

| Description | Value |
|---|---|
| MS-provided or network-provided APN, subscription verified | 0 |
| MS-provided APN, subscription not verified | 1 |
| Network-provided APN, subscription not verified | 2 |
| For future use.<br>NOTE: This selection mode should not be sent. However, if it is received, then its value is interpreted as 2. | 3 |

**Default** If you do not configure this statement, then the broadband gateway allows the Create Session Request or Create PDP Context message with the selection mode IE value of 0.

**Options** **from-ms**—Admit subscribers with a mobile-station-provided APN without a verified subscription.

**from-sgsn**—Admit subscribers with a network-provided APN without a verified subscription.

**no-subscribed**—Reject subscribers with a mobile-station-provided or a network-provided APN, with a verified subscription.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- apns on page 735
- Configuring General APN Parameters on the Broadband Gateway on page 115

## service-mode (APN)

**Syntax**
service-mode *service-mode-options*;

**Hierarchy Level**
[edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information**
Statement introduced in Junos OS Mobility Release 11.2W.

**Description**
Specify that the access point name (APN) should be in **maintenance** mode. You do this if you want to carry out maintenance tasks like deleting an APN or changing the APN type and so on. See the *Maintenance Mode* chapter in the *MobileNext Broadband Gateway Configuration Guide* for a list of the maintenance tasks that can be carried out when the APN is in maintenance mode.

When in the **Maintenance Mode Active Phase**, all the valid attributes on the object can be modified. In other cases, only the non-maintenance mode attributes can be modified.

**Options**
***service-mode-options***—Specify the service mode. Currently, **maintenance** mode is the only option supported.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- apns on page 735
- Configuring the Mobile Interface of an Access Point Name on page 412
- Deleting an Access Point Name on page 413
- Example: Changing Access Point Name Values on page 432
- Modifying an Access Point Name on page 410

## service-selection-profile (APN)

**Syntax** service-selection-profile *service-selection-profile*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the service selection profile to be used for the access point name (APN). Service selection profiles specify the selection criteria that determine which subscribers use the APN or are serviced by the broadband gateway. Service selection profiles are used to redirect subscribers to a peer, or to map a virtual APN to a real APN.

NOTE: **The service selection profile must be previously configured on the broadband gateway at the [edit unified-edge gateways ggsn-pgw *gateway-name*] hierarchy level.**

**Options** ***service-selection-profile***—Service selection profile for the APN.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring APN Service Selection on a Broadband Gateway on page 129
- service-selection-profiles on page 808

## service-set-options

**Syntax**

```
service-set-options {
  subscriber-awareness;
}
```

**Hierarchy Level** [edit services service-set *service-set-name*]

**Release Information** Statement introduced in Junos OS Release 10.1.

**Description** Specify the service set options to apply to a service set. These options are used to indicate to the mobility control plane infrastructure that the services PIC should be programmed with the subscriber data on receipt of a Create Subscriber Request message.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- service-set (Aggregated Multiservices) on page 1054

## session-timeout (APN)

**Syntax** session-timeout *session-timeout*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the session timeout for the access point name (APN). The session timeout is the period that a default bearer or a primary packet data protocol (PDP) context is active (with or without receiving data packets) before timing out. When the configured session timeout expires, the broadband gateway deactivates the default bearer or the primary PDP context.

**Options** ***session-timeout***—Session timeout for the APN.

**Range:** 0 through 720 hours
**Default:** 0 hours indicates that session timeout will not be enabled for the APN.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring General APN Parameters on the Broadband Gateway on page 115

## subscriber-awareness (Service Set Options)

**Syntax** subscriber-awareness;

**Hierarchy Level** [edit services service-set *service-set-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Enable subscriber awareness on the service set.

To provide subscriber-aware services, you must configure the **subscriber-aware** statement on the service set. This is a prerequisite for obtaining mobility subscriber-aware services on the service set. For subscriber-aware HTTP header enrichment (HTTP HE) services for mobility, the service set containing the HTTP HE rules must be configured as subscriber-aware.

Configuring a service set as subscriber-aware allows services to obtain subscriber-specific information. In the case of HTTP HE, the subscriber-specific information is the Mobile Station ISDN (MSISDN) number or the International Mobile Subscriber Identity (IMSI) of the mobile subscriber. Configuring a service set as subscriber-aware enables the HTTP HE service to correlate the HTTP connections with the correct subscriber and insert the subscriber's corresponding IMSI or MSISDN into the HTTP header, as configured in the HTTP HE rules.

**Default** If you do not include the **subscriber-awareness** statement, then mobility subscriber-aware services cannot be provided.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring HTTP Header Enrichment on page 143
- service-set-options on page 784

## tag (HTTP Header Enrichment)

**Syntax**

```
tag tag-name {
  encrypt {
    hash algorithm;
    prefix hash-prefix;
  }
  tag-attribute tag-attr-name;
  tag-header header;
  tag-separator separator;
}
```

**Hierarchy Level** [edit services hcm tag-rule *rule-name* term *term-name* then]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the tags to be applied to the HTTP headers matching the criteria specified in the **from** statement. If you configure a tag, you must include the **tag-header** statement.

The remaining statements are explained separately.

**Options** *tag-name*—Name of the tag.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring HTTP Header Enrichment on page 143
- then (HTTP Header Enrichment) on page 794

## tag-attribute (HTTP Header Enrichment)

**Syntax** tag-attribute [*attr-name*];

**Hierarchy Level** [edit services hcm]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the list of tag attributes to be used for the tag rules for HTTP header enrichment.

These attributes are stored in the subscriber database for mobile subscribers. Once these attributes are configured, they can be used in the tag rules. HTTP tag rules can be configured to choose one or more of these attributes to insert in the HTTP header.

**Options** *attr-name*—Tag attribute. To specify multiple attributes at one time, include the attributes in square brackets ([]). The supported mobile attributes are **imsi** and **msisdn**.

**Values:** Up to 63 characters

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**
- Configuring HTTP Header Enrichment on page 143
- hcm (HTTP Header Enrichment) on page 755

## tag-attribute (HTTP Header Enrichment Tag)

**Syntax** tag-attribute [*tag-attr-name*];

**Hierarchy Level** [edit services hcm tag-rule *rule-name* term *term-name* then tag *tag-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the tag attribute (for the tag header and separator) to insert into the HTTP header.

NOTE: **The tag attribute specified here must already be defined at the [edit services hcm] hierarchy level.**

**Options** *tag-attr-name*—Tag attribute.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**
- Configuring HTTP Header Enrichment on page 143
- tag (HTTP Header Enrichment) on page 786

## tag-header (HTTP Header Enrichment)

**Syntax** tag-header *header*;

**Hierarchy Level** [edit services hcm tag-rule *rule-name* term *term-name* then tag *tag-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the tag header for the tag to be inserted into the HTTP header. This is a required configuration.

**Options** *header*—Tag header.

**Values:** Up to 63 characters

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring HTTP Header Enrichment on page 143
- tag (HTTP Header Enrichment) on page 786

## tag-rule (HTTP Header Enrichment)

**Syntax**

```
tag-rule rule-name {
  term term-name {
    from {
      destination-address {
        (any-unicast | any-unicast except);
        [prefix];
      }
      destination-address-range {
        [high address low address] [except];
      }
      destination-port-range {
        [high port-number low port-number];
      }
      destination-ports [value];
      destination-prefix-list {
        (prefix-name | prefix-name except);
      }
    }
    then{
      count;
      tag tag-name {
        encrypt {
          hash algorithm;
          prefix hash-prefix;
        }
        tag-attribute tag-attr-name;
        tag-header header;
        tag-separator separator;
      }
    }
  }
}
```

**Hierarchy Level** [edit services hcm]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the tag rules that the broadband gateway uses to determine which HTTP headers are enriched with the appropriate tags.

**Options** *rule-name*—Name of the tag rule.

**Values:** 1 through 63 characters

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring HTTP Header Enrichment on page 143
- hcm (HTTP Header Enrichment) on page 755

## tag-rules (HTTP Header Enrichment)

**Syntax** [tag-rules *rule-name*];

**Hierarchy Level** [edit services service-set *service-set-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify one or more tag rules to apply to a service set.

The tag rules are matched in the order that they are configured. If a rule is matched, then the actions specified in the tag rule are applied and the subsequent tag rules are skipped.

**Options** ***rule-name***—Name of the tag rule.

You can specify multiple tag rules by including the **tag-rules** statement multiple times.

NOTE: **The tag rules must already be defined at the [edit services hcm] hierarchy level.**

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring HTTP Header Enrichment on page 143
- service-set (Aggregated Multiservices) on page 1054

## tag-rule-set (HTTP Header Enrichment)

**Syntax**

```
tag-rule-set rule-set-name {
    [rule rule-name];
}
```

**Hierarchy Level** [edit services hcm]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the tag rule set for HTTP header enrichment. You do this to group multiple configured tag rules into one tag rule set.

**Options** ***rule-set-name***—Name of the tag rule set.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring HTTP Header Enrichment on page 143
- hcm (HTTP Header Enrichment) on page 755

## tag-rule-sets (HTTP Header Enrichment)

**Syntax** [tag-rule-sets *rule-set-name*];

**Hierarchy Level** [edit services service-set *service-set-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify one or more tag rule sets to apply to a service set. If you have multiple tag rules to match, you can combine them together into a single tag rule set that can then be used across multiple service sets.

**Options** *rule-set-name*—Name of the tag rule set.

You can specify multiple tag rule sets by including the **tag-rule-sets** statement multiple times.

NOTE: **The tag rule set must already be defined at the [edit services hcm] hierarchy level.**

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring HTTP Header Enrichment on page 143
- **service-set (Aggregated Multiservices) on page 1054**

## tag-separator (HTTP Header Enrichment)

**Syntax** tag-separator *separator*;

**Hierarchy Level** [edit services hcm tag-rule *rule-name* term *term-name* then tag *tag-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the tag separator for the tag to be inserted into the HTTP header.

**Options** *separator*—Tag separator.
**Syntax:** 1 character
**Default:** / (forward slash)

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring HTTP Header Enrichment on page 143
- **tag (HTTP Header Enrichment) on page 786**

## term (HTTP Header Enrichment)

**Syntax**

```
term term-name {
  from {
    destination-address {
      (any-unicast | any-unicast except);
      [prefix];
    }
    destination-address-range {
      [high address low address] [except];
    }
    destination-port-range {
      [high port-number low port-number];
    }
    destination-ports [value];
    destination-prefix-list {
      (prefix-name | prefix-name except);
    }
  }
  then{
    count;
    tag tag-name {
      encrypt {
        hash algorithm;
        prefix hash-prefix;
      }
      tag-attribute tag-attr-name;
      tag-header header;
      tag-separator separator;
    }
  }
}
```

**Hierarchy Level** [edit services hcm tag-rule *rule-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the term (for the tag rule) that can be used to determine which HTTP headers are enriched. Multiple terms can be configured for a tag rule. Terms are evaluated in the order they are configured for a tag rule. If a data packet matches the criteria in any of the terms, then the actions specified in the **then** statement are applied. The data packet must match all the match conditions specified in a **from** statement. Once a term matches for a data packet, however, further terms are not evaluated. If no terms match, then the HTTP header is not enriched.

NOTE: You must configure at least one term for the tag rule.

The remaining statements are explained separately.

**Options** ***term-name***—Identifier for the term.

**Range:** 1 through 32,767

**Required Privilege Level**
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**
- Configuring HTTP Header Enrichment on page 143
- tag-rule (HTTP Header Enrichment) on page 789

## then (HTTP Header Enrichment)

**Syntax**

```
then {
  count;
  tag tag-name {
    encrypt {
      hash algorithm;
      prefix hash-prefix;
    }
    tag-attribute tag-attr-name;
    tag-header header;
    tag-separator separator;
  }
}
```

**Hierarchy Level** [edit services hcm tag-rule *rule-name* term *term-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the actions to be taken if the criteria specified in the tag rule are matched. All the actions specified here are applied when the criteria match.

NOTE: You must configure this statement and include at least one action to be taken for the tag rule term.

The remaining statements are explained separately.

**Required Privilege Level**
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**
- Configuring HTTP Header Enrichment on page 143
- hcm (HTTP Header Enrichment) on page 755

## verify-source-address (APN)

**Syntax**

```
verify-source-address {
  disable;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the verification of the IP address of the user equipment (UE) for the access point name (APN). The broadband gateway checks whether the source IP address in the data transfer packets from the user equipment is the same address that has been allocated by the gateway.

**Default** If this statement is not configured, then the source IP address of the user equipment is always verified by the broadband gateway.

**Options** **disable**—Disable the verification of the source IP address of the user equipment. The broadband gateway does not verify the source IP address of the user equipment during data transfers.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring General APN Parameters on the Broadband Gateway on page 115

## visitor-profile

**Syntax** visitor-profile *visitor-profile*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* charging], [edit unified-edge gateways sgw *gateway-name* charging global-profile]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging global-profile]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the profile that should be used to charge visiting subscribers. If the **profile-selection-order** configuration indicates **static**, then this profile is used for visiting subscribers.

NOTE: **The charging profile must already be configured on the broadband gateway.**

The broadband gateway determines whether the subscriber is a visitor by using the mobile country code (MCC) and the mobile network code (MNC) values in the Create Session Request message from the subscriber's user equipment (UE). If the subscriber's International Mobile Subscriber Identity (IMSI), MCC, and MNC do not belong to the PLMN to which both the GGSN or P-GW and the S-GW belong, then the subscriber is deemed a visitor and the **visitor-profile** is applied. If the **visitor-profile** is not configured, then the **default-profile**, if configured, is applied. If the **default-profile** is also not configured, then the subscriber session is created with no charging applied.

**Options** ***visitor-profile***—Name of the visitor profile.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- **charging (APN) on page 739**
- **charging-profiles on page 824**
- **global-profile (Serving Gateway) on page 851**

## wait-accounting (APN)

**Syntax** wait-accounting;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the user equipment (UE) sessions to wait for the accounting response from the authentication, authorization, and accounting (AAA) server, before sending the Create Session Response or Create packet data protocol (PDP) Response to the Serving Gateway (S-GW) or the serving GPRS support node (SGSN).

If the APN is enabled for AAA accounting, then the broadband gateway, which receives the Create Session Request or Create PDP Context Request message from the user equipment, sends an Accounting Start message containing the subscriber's Mobile Station ISDN (MSISDN) number and IP address to the AAA server. Typically, the gateway does not wait for the accounting response from the AAA server before sending the Create Session Response or Create PDP Context Response message.

However, when **wait-accounting** is enabled, the gateway will send the Create Session Response or Create PDP Context Response message after it receives the Accounting Start Response message from the AAA server.

**Default** If you do not configure this statement, then the gateway does not wait for the accounting response from the AAA server before sending the Create Session Response or Create PDP Context Response message to the S-GW or SGSN.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- apns on page 735
- Configuring General APN Parameters on the Broadband Gateway on page 115

# Service Selection Profiles Configuration Statements

## apn-name (Service Selection Profiles)

**Syntax** apn-name *apn-name*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* service-selection-profiles *profile-name* term *name* then]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the access point name (APN) to be used for the subscriber's session.

This configuration is applicable only when the APN specified in the Create Session Request message from the subscriber is **virtual**. The virtual APN in the Create Session Request message is mapped to the real APN that you specify here.

NOTE: **The APN that you specify must be real and must be configured on the broadband gateway.**

**Options** *apn-name*—Name of the real APN.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring APN Service Selection on a Broadband Gateway on page 129
- **then (Service Selection Profiles) on page 811**

## charging-characteristics (Service Selection Profiles)

**Syntax** charging-characteristics *charging-characteristics*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* service-selection-profiles *profile-name* term *name* from]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the charging characteristics for term matching. If the value of the charging characteristics information element (IE) in the Create Session Request or Create Packet Data Protocol (PDP) Context message matches the charging characteristics value specified here, then the actions specified for the service selection profile are performed.

**Options** ***charging-characteristics***—Charging characteristics to be used for term matching.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring APN Service Selection on a Broadband Gateway on page 129
- from (Service Selection Profiles) on page 800

## from (Service Selection Profiles)

**Syntax**

```
from {
  anonymous-user;
  domain-name domain-name;
  charging-characteristics charging-characteristics;
  imei imei;
  imsi imsi;
  maximum-bearers maximum-bearers;
  msisdn msisdn;
  pdn-type (ipv4 | ipv4v6 | ipv6);
  peer peer;
  peer-routing-instance peer-routing-instance;
  plmn {
    except;
    mcc {
      mcc;
      mnc mnc;
    }
  }
  rat-type (EUTRAN | GERAN | HSPA | UTRAN | WLAN);
  roaming-status (home | roamer | visitor);
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* service-selection-profiles *profile-name* term *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the match criteria for the service selection profile term.

NOTE: For any term, the subscriber must match all the match conditions specified in a **from** statement. If you do not configure the **from** statement, then all subscribers are considered a match.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring APN Service Selection on a Broadband Gateway on page 129
- term (Service Selection Profiles) on page 810

## imei (Service Selection Profiles)

**Syntax** imei *imei*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* service-selection-profiles *profile-name* term *name* from]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the International Mobile Station Equipment Identity (IMEI) for term matching. If the IMEI of the user equipment (UE) matches the IMEI specified here, then the actions specified for the service selection profile are performed.

NOTE: You can specify either the full IMEI or a prefix—that is, the first few digits of the IMEI.

**Options** *imei*—IMEI to be used for term matching.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring APN Service Selection on a Broadband Gateway on page 129
- from (Service Selection Profiles) on page 800

## imsi (Service Selection Profiles)

**Syntax** imsi *imsi*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* service-selection-profiles *profile-name* term *name* from]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the International Mobile Subscriber Identity (IMSI) for term matching. If the IMSI of the user equipment (UE) matches the IMSI specified here, then the actions specified for the service selection profile are performed.

NOTE: You can specify either the full IMSI or a prefix—that is, the first few digits of the IMSI.

**Options** *imsi*—IMSI to be used for term matching.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring APN Service Selection on a Broadband Gateway on page 129
- from (Service Selection Profiles) on page 800

## maximum-bearers (Service Selection Profiles)

**Syntax** maximum-bearers *maximum-bearers*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* service-selection-profiles *profile-name* term *name* from]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the maximum number of bearers to be used for term matching. The ***maximum-bearers*** that you specify is matched against the number of bearers in the broadband gateway. If the number of bearers in the broadband gateway (at the time when the term matching is done) exceeds the value that you specify, then that is considered a match.

**Options** ***maximum-bearers***—Maximum number of bearers to be used for term matching.

**Range:** 1 through 10,000,000

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring APN Service Selection on a Broadband Gateway on page 129
- from (Service Selection Profiles) on page 800

## msisdn (Service Selection Profiles)

**Syntax** msisdn *msisdn*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* service-selection-profiles *profile-name* term *name* from]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the Mobile Station ISDN (MSISDN) number for term matching. If the MSISDN of the user equipment (UE) matches the MSISDN number specified here, then the actions specified for the service selection profile are performed.

NOTE: You can specify either the full MSISDN number or a prefix—that is, the first few digits of the MSISDN number.

**Options** ***msisdn***—MSISDN number to be used for term matching.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring APN Service Selection on a Broadband Gateway on page 129
- from (Service Selection Profiles) on page 800

## pdn-type (Service Selection Profiles)

**Syntax** pdn-type (ipv4 | ipv4v6 | ipv6);

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* service-selection-profiles *profile-name* term *name* from]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the type of Packet Data Network (PDN) for term matching. If the type of PDN of the user equipment (UE) matches the type of PDN specified here, then the actions specified for the service selection profile are performed.

**Options** **ipv4**—Match PDNs supporting only IPv4.

**ipv4v6**—Match PDNs supporting both IPv4 and IPv6.

**ipv6**—Match PDNs supporting only IPv6.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Configuring APN Service Selection on a Broadband Gateway on page 129
- from (Service Selection Profiles) on page 800

## peer (Service Selection Profiles)

**Syntax** peer *peer*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* service-selection-profiles *profile-name* term *name* from]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the IP address of the peer for term matching. If the IP address of the peer creating the session matches the IP address specified here, then the actions specified for the service selection profile are performed.

**Options** ***peer***—IP address to be used for term matching.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Configuring APN Service Selection on a Broadband Gateway on page 129
- from (Service Selection Profiles) on page 800

## peer-routing-instance (Service Selection Profiles)

**Syntax** peer-routing-instance *peer-routing-instance*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* service-selection-profiles *profile-name* term *name* from]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the peer routing instance for term matching. If the routing instance of the peer creating the session matches the routing instance specified here, then the actions specified for the service selection profile are performed.

NOTE: This statement should be configured along with the peer statement.

**Options** ***peer-routing-instance***—Peer routing instance to be used for term matching.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring APN Service Selection on a Broadband Gateway on page 129
- from (Service Selection Profiles) on page 800

## redirect-peer (Service Selection Profiles)

**Syntax** redirect-peer *redirect-peer*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* service-selection-profiles *profile-name* term *name* then]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the IP address of the peer to which the Create Session Request should be redirected. The Create Session Request message is then redirected to the IP address of the redirect peer that you specify.

The Create Session Response from the redirect peer is received by the broadband gateway and forwarded to the originator of the request. However, since the Create Session Response message contains the address of the redirected peer, further requests for the subscriber are directly sent by the originator to the redirect peer.

**Options** *redirect-peer*—IP address of the peer to which the session creation request should be redirected.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring APN Service Selection on a Broadband Gateway on page 129
- then (Service Selection Profiles) on page 811

## service-selection-profiles

**Syntax**

```
service-selection-profiles {
  profile-name {
    term name {
      from {
        anonymous-user;
        domain-name domain-name;
        charging-characteristics charging-characteristics;
        imei imei;
        imsi imsi;
        maximum-bearers maximum-bearers;
        msisdn msisdn;
        pdn-type (ipv4 | ipv4v6 | ipv6);
        peer peer;
        peer-routing-instance peer-routing-instance;
        plmn {
          except;
          mcc {
            mcc;
            mnc mnc;
          }
        }
        rat-type (EUTRAN | GERAN | HSPA | UTRAN | WLAN);
        roaming-status (home | roamer | visitor);
      }
      then {
        accept;
        apn-name apn-name;
        charging-profile charging-profile;
        pcef-profile pcef-profile;
        redirect-peer redirect-peer;
        reject;
      }
    }
  }
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the access point name (APN) to be used for the subscriber, or the broadband gateway that will service the subscriber. Service selection profiles specify the selection criteria that determine which subscribers use the APN or are serviced by the broadband gateway.

Multiple terms can be configured in a selection profile, and each term is applied in the order in which it is configured. Furthermore, multiple match conditions can be specified within a term and all of the conditions have to match. After a matching term is found, the action is applied and no further terms are matched. If no term matches for a subscriber, then the services associated with the APN in the Create Session Request message are applied.

**Options**

***profile-name***—Name of the service selection profile.

**Syntax:** Up to 63 characters.

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- [edit unified-edge gateways ggsn-pgw <gateway-name>] Hierarchy Level on page 604
- Configuring APN Service Selection on a Broadband Gateway on page 129
- Example: Configuring Broadband Gateway APNs on page 134

## term (Service Selection Profiles)

**Syntax**

```
term name {
  from {
    anonymous-user;
    domain-name domain-name;
    charging-characteristics charging-characteristics;
    imei imei;
    imsi imsi;
    maximum-bearers maximum-bearers;
    msisdn msisdn;
    pdn-type (ipv4 | ipv4v6 | ipv6);
    peer peer;
    peer-routing-instance peer-routing-instance;
    plmn {
      except;
      mcc {
        mcc;
        mnc mnc;
      }
    }
    rat-type (EUTRAN | GERAN | HSPA | UTRAN | WLAN);
    roaming-status (home | roamer | visitor);
  }
  then {
    accept;
    apn-name apn-name;
    charging-profile charging-profile;
    pcef-profile pcef-profile;
    redirect-peer redirect-peer;
    reject;
  }
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* service-selection-profiles *profile-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the term for the service selection profile that can be used by the access point name (APN).

Multiple terms can be configured for a service selection profile. If a subscriber matches any of the terms, then the service specified in the **then** statement is applied. The subscriber must match all the match conditions specified in a **from** statement. Once a term matches for a subscriber, however, further terms are not evaluated. If no terms match for a subscriber, then the default services associated with the particular APN are applied.

The remaining statements are explained separately.

**Options** *name*—Name of the selection term.

**Syntax:** Up to 63 characters.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Configuring APN Service Selection on a Broadband Gateway on page 129
- service-selection-profiles on page 808

## then (Service Selection Profiles)

**Syntax**

```
then {
  accept;
  apn-name apn-name;
  charging-profile charging-profile;
  pcef-profile pcef-profile;
  redirect-peer redirect-peer;
  reject;
}
```

**Hierarchy Level**
[edit unified-edge gateways ggsn-pgw *gateway-name* service-selection-profiles *profile-name* term *name*]

**Release Information**
Statement introduced in Junos OS Mobility Release 11.2W.

**Description**
Specify the action to be taken if the criteria specified in the service selection profile statement are matched.

NOTE: This statement is mandatory even if you have not specified any match criteria. The absence of match criteria (from statement) indicates that all subscribers are matched and the specified action is taken.

The remaining statements are explained separately.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Configuring APN Service Selection on a Broadband Gateway on page 129
- term (Service Selection Profiles) on page 810

CHAPTER 22

# Charging Configuration Statements

## cdr-aggregation-limit

**Syntax** cdr-aggregation-limit *value*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways],
[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the maximum number of Charging Data Records (CDRs) that can be added to a Data Record Transfer (DRT) message before it is transmitted.

A DRT message containing the CDRs is transmitted from the charging data function (CDF) to the charging gateway function (CGF) server, when the **cdr-aggregation-limit** or the **mtu** size is reached (whichever comes first). For efficient transmissions of DRT messages, you may want to set the **cdr-aggregation-limit** to the maximum value of 16.

**Options** ***value***—Number of CDRs that can be added to a DRT message.

**Range:** 1 through 16

**Default:** 5

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- charging-gateways on page 823
- Configuring Transport Profiles on page 303
- Configuring Charging on page 287

## cdr-profile

**Syntax** cdr-profile *profile-name*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging charging-profiles *profile-name*],
[edit unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Associate a Charging Data Record (CDR) profile with a charging profile. However, make sure this profile has been previously defined.

When a subscriber session is created, the subscriber is bound to a charging profile and the CDR profile configuration associated with this profile determines the information (fields) that is included in the CDRs and is used for billing purposes.

Any modification to the existing configuration of this attribute must be done only when the charging profile with which it is associated is under active maintenance mode. Use one of the following commands, as applicable, to bring the charging profile under maintenance mode:

- For the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW)—**set unified-edge gateways ggsn-pgw *gateway-name* charging charging-profiles *profile-name* service-mode maintenance**
- For the Serving Gateway (S-GW)—**set unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name* service-mode maintenance**

TIP: If the profile is not already defined, use the one of the following commands, as applicable, to define a new CDR profile:

- GGSN or P-GW—**set unified-edge gateways ggsn-pgw *gateway-name* charging cdr-profiles *profile-name***
- S-GW—**set unified-edge gateways sgw *gateway-name* charging cdr-profiles *profile-name***

**Options** ***profile-name***—Name of the CDR profile to be associated with the charging profile.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- charging-profiles on page 824
- Configuring Charging Profiles on page 308

- Configuring Charging on page 287
- Charging Profiles on page 285

## cdr-profiles

**Syntax**

```
cdr-profiles profile-name {
  description string;
  enable-reduced-partial-cdrs;
  exclude-ie-options {
    apn-ni;
    apn-selection-mode;
    cc-selection-mode;
    dynamic-address;
    list-of-service-data;
    list-of-traffic-volumes;
    lrsn;
    ms-time-zone;
    network-initiation;
    node-id;
    pdn-connection-id;
    pdppdn-type;
    pgw-address-used; # S-GW only
    pgw-plmn-identifier;
    rat-type;
    record-sequence-number;
    served-imeisv;
    served-msisdn;
    served-pdppdn-address;
    serving-node-plmn-identifier;
    sgw-change; # S-GW only
    start-time;
    stop-time;
    user-location-information;
  }
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* charging],
[edit unified-edge gateways sgw *gateway-name* charging]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

Configure a Charging Data Record (CDR) profile. The configuration in the CDR profile determines the content or the information that is included in a CDR and is used for billing purposes.

By default, the Juniper Charging Service (J-CS) module adds all the required fields mandated by the Third-Generation Partnership Project (3GPP) standards to the CDR. However, you can exclude the provisional fields information from the CDR by configuring a CDR profile.

The maximum number of CDR profiles supported for the broadband gateway is 255.

The remaining statements are explained separately.

**Options** ***profile-name***—Name of the CDR profile.
**Values:** 1 through 128 bytes

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- charging on page 819
- Configuring CDR Attributes on page 306
- Configuring Charging on page 287

## cdr-release

**Syntax** cdr-release (r7 | r8 | r99);

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways],
[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** The encoding of the Charging Data Record (CDR) is compliant with the 3GPP technical specification release version that is configured using the statement. The supported versions are 3GPP release versions 7, 8, and 99.

NOTE: 3GPP release versions 7 and 99 are not applicable to the Serving Gateway (S-GW). 3GPP release version 8 is applicable to the GGSN, P-GW, and S-GW.

**Options** **r7**—3GPP release version, 7.

**r8**—3GPP release version, 8.

**r99**—3GPP release version, 99.
**Default:** r8

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- charging-gateways on page 823
- Configuring Transport Profiles on page 303
- Configuring Charging on page 287

## cdrs-per-file

**Syntax** cdrs-per-file *value*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging local-persistent-storage-options],
[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the maximum number of Charging Data Records (CDRs) that can be added to a file after which the temporary CDR log file is closed and moved to a final location within the same disk (**/opt/mobility/charging/ggsn/final_log**), from where it can be transferred using SSH FTP (SFTP). Files transferred from the final location should be deleted from the local Routing Engine disk after the transfer. Only authorized users can transfer and delete the files (after the transfer).

However, any one of the following conditions must be met (whichever comes first) before the files are moved from the temporary location to the final location:

- Number of CDRs per file reaches the configured or default limit.
- Size of the file reaches the configured or default limit.
- Age of the file reaches the configured or default limit.

NOTE: **The default limit is applicable only if you have not configured any value.**

**Options** ***value***—Maximum number of CDRs that can be added to a file after which it is closed and moved to a location within the Routing Engine disk, from where it can be transferred using SFTP.

**Range:** 5000 through 1,000,000

**Default:** 0, which indicates that there is no trigger for the CDR count per file.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- local-persistent-storage-options on page 855
- Configuring Persistent Storage on page 299
- Configuring Charging on page 287

## charging

**Syntax**

```
charging {
  cdr-profiles profile-name {
    description string;
    enable-reduced-partial-cdrs;
    exclude-ie-options {
      apn-ni;
      apn-selection-mode;
      cc-selection-mode;
      dynamic-address;
      list-of-service-data;
      list-of-traffic-volumes;
      lrsn;
      ms-time-zone;
      network-initiation;
      node-id;
      pdn-connection-id;
      pdppdn-type;
      pgw-address-used; # S-GW only
      pgw-plmn-identifier;
      rat-type;
      record-sequence-number;
      served-imeisv;
      served-msisdn;
      served-pdppdn-address;
      serving-node-plmn-identifier;
      sgw-change; # S-GW only
      start-time;
      stop-time;
      user-location-information;
    }
  }
  charging-profiles profile-name {
    cdr-profile profile-name;
    default-rating-group rg-num;
    default-service-id id-num;
    description string;
    profile-id id-num;
    transport-profile profile-name;
    trigger-profile profile-name;
    service-mode maintenance;
  }
  global-profile { # S-GW only
    default-profile default-profile;
    home-profile home-profile;
    profile-selection-order [profile-selection-method];
    roamer-profile roamer-profile;
    visitor-profile visitor-profile;
  }
  gtpp {
    destination-port port-number;
    down-detect-time duration;
    echo-interval duration;
```

```
    header-type (long | short);
    n3-requests requests;
    no-path-management;
    pending-queue-size value;
    peer peer-name {
      destination-ipv4-address address;
      destination-port port-number;
      down-detect-time duration;
      echo-interval duration;
      header-type (long | short);
      n3-requests requests;
      no-path-management;
      pending-queue-size value;
      reconnect-time duration;
      source-interface interface-name [ipv4-address address];
      t3-response response-interval;
      transport-protocol (tcp | udp);
      version (v0 | v1 | v2);
    }
    reconnect-time duration;
    source-interface {
      interface-name;
      ipv4-address address;
    }
    t3-response response-interval;
    transport-protocol (tcp | udp);
    version (v0 | v1 | v2);
  }
  local-persistent-storage-options {
    cdrs-per-file value;
    disable-replication;
    disk-space-policy {
      watermark-level-1 {
        notification-level (both | snmp-alarm | syslog);
        percentage value;
      }
      watermark-level-2 {
        notification-level (both | snmp-alarm | syslog);
        percentage value;
      }
      watermark-level-3 {
        notification-level (both | snmp-alarm | syslog);
        percentage value;
      }
    }
    file-age {
      age;
      disable;
    }
    file-creation-policy (shared-file | unique-file);
    file-format (3gpp | raw-asn);
    file-name-private-extension string;
    file-size {
      size;
      disable;
    }
```

```
    traceoptions {
      file file-name <files number> <match regular-expression> <no-world-readable |
        world-readable> <size size>;
      flag flag;
      level (all | critical | error | info | notice | verbose | warning);
      no-remote-trace;
    }
    user-name string;
    world-readable;
  }
  traceoptions {
    file file-name <files number> <no-world-readable | world-readable> <size size>;
    flag flag;
    level (all | critical | error | info | notice | verbose | warning);
    no-remote-trace;
  }
  transport-profiles profile-name {
    description string;
    offline {
      charging-gateways {
        cdr-aggregation-limit value;
        cdr-release (r7 | r8 | r99);
        mtu value;
        peer-order {
          [peer charging-gateway-peer-name];
        }
        persistent-storage-order {
          local-storage;
        }
        switch-back-time seconds;
      }
    }
    service-mode maintenance;
  }
  trigger-profiles profile-name {
    description string;
    offline {
      container-limit value;
      exclude {
        ms-timezone-change;
        plmn-change;
        qos-change;
        rat-change;
        sgsn-mme-change; #S-GW only
        sgsn-sgw-change; #P-GW only
        user-location-change;
      }
      sgsn-mme-change-limit value; #S-GW only
      sgsn-sgw-change-limit value; #P-GW only
      time-limit value;
      volume-limit {
        value;
        direction (both | uplink);
      }
    }
    tariff-time-list {
```

```
        [tariff-time];
    }
  }
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*],
[edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** The configuration in this hierarchy determines the overall charging configuration for a subscriber.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- ggsn-pgw on page 1061
- Configuring Charging on page 287
- Charging on page 279
- Charging Services Overview on page 279
- Charging Data Records on page 281
- Charging Profiles on page 285
- sgw on page 1073

## charging-gateways

**Syntax**

```
charging-gateways {
  cdr-aggregation-limit value;
  cdr-release (r7 | r8 | r99);
  mtu value;
  peer-order {
    [peer charging-gateway-peer-name];
  }
  persistent-storage-order {
    local-storage;
  }
  switch-back-time seconds;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* charging transport-profiles *profile-name* offline],
[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

Configure a group of GTP Prime peers, the local Routing Engine disk, or both for Charging Data Record (CDR) file storage. In addition, you can configure the following:

- The maximum CDRs that can be added to a Data Record Transfer (DRT) message.
- The maximum transmission unit of a DRT message.
- The generated CDRs to be compliant with a specific 3GPP release.
- The duration the charging data function (CDF) waits before transmitting the CDRs to a peer that has recently come up and has the highest priority among all the peers, which are alive.

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- offline on page 860
- Configuring Transport Profiles on page 303
- Configuring Charging on page 287

## charging-profiles

**Syntax**

```
charging-profiles profile-name {
  cdr-profile profile-name;
  default-rating-group rg-num;
  default-service-id id-num;
  description string;
  profile-id id-num;
  service-mode maintenance;
  transport-profile profile-name;
  trigger-profile profile-name;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging],
[edit unified-edge gateways sgw *gateway-name* charging]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure a charging profile. The charging profile determines the overall charging configuration for a subscriber, such as the data collected in a Charging Data Record (CDR), the events that generate the CDR, where the CDR is stored, and so on for that subscriber.

You can configure up to a maximum of 255 charging profiles.

The remaining statements are explained separately.

**Options** ***profile-name***—Name of the charging profile.

**Values:** 1 through 128 bytes

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- charging on page 819
- Configuring Charging Profiles on page 308
- Charging Profiles on page 285
- Configuring Charging on page 287

## container-limit

**Syntax** container-limit *value*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging trigger-profiles *profile-name* offline],
[edit unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name* offline]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name* offline]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the maximum number of containers that can be added to a Charging Data Record (CDR). When the limit is reached, the CDR is closed.

**Options** ***value***—Maximum number of containers.

**Range:** 1 through 15

**Default:** 5

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- offline on page 861
- Configuring Charging Trigger Events on page 304
- Configuring Charging on page 287

## default-profile

**Syntax** default-profile *default-profile*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* charging], [edit unified-edge gateways sgw *gateway-name* charging global-profile]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging global-profile]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the default profile. If the **profile-selection-order** configuration indicates **static**, and if the corresponding charging profile applicable to the type of subscriber (home, visitor, or roamer) has not been specified, then the default profile is applied.

NOTE: The charging profile must already be configured on the broadband gateway.

The broadband gateway determines the type of subscriber by using the mobile country code (MCC) and the mobile network code (MNC) values in the Create Session Request message from the subscriber's user equipment (UE) and compares these with the corresponding values configured for the home public land mobile network (HPLMN). Depending on whether a subscriber is a home subscriber, a visitor, or a roamer, the **home-profile**, **visited-profile**, or **roamer-profile** is applied. If the applicable profile is not configured, then the **default-profile**, if configured, is applied. If the **default-profile** is also not configured, then the subscriber session is created with no charging applied.

**Options** ***default-profile***—Name of the default profile.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- charging (APN) on page 739
- charging-profiles on page 824
- global-profile (Serving Gateway) on page 851

## default-rating-group

**Syntax** default-rating-group *rg-num*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging charging-profiles *profile-name*],
[edit unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Specify a default rating group to be used for charging service data containers. The rating group represents a collection of services.

When this option is configured and if the Charging Data Record (CDR) release used is **r7**, then the P-GW generates a service data container, which is added to the CDR.

NOTE: **This configuration is not applicable for the Serving Gateway (S-GW).**

**Options** *rg-num*—Default rating group to be used for charging.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- charging-profiles on page 824
- Configuring Charging Profiles on page 308
- Charging Profiles on page 285
- Configuring Charging on page 287

## default-service-id

**Syntax** default-service-id *id-num*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging charging-profiles *profile-name*],
[edit unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the default service identifier to be used for charging service data containers. This ID is used to identify the service or the service component.

When this option is configured and if the Charging Data Record (CDR) release used is **r7**, then the P-GW generates a service data container, which is added to the CDR.

NOTE: This configuration is not applicable for the Serving Gateway (S-GW).

**Options** *id-num*—Default service identifier to be used for charging.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- charging-profiles on page 824
- Configuring Charging Profiles on page 308
- Charging Profiles on page 285
- Configuring Charging on page 287

## description

**Syntax** description *string*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging cdr-profiles *profile-name*],
[edit unified-edge gateways ggsn-pgw *gateway-name* charging charging-profiles *profile-name*],
[edit unified-edge gateways ggsn-pgw *gateway-name* charging transport-profiles *profile-name*],
[edit unified-edge gateways ggsn-pgw *gateway-name* charging trigger-profiles *profile-name*],
[edit unified-edge gateways sgw *gateway-name* charging cdr-profiles *profile-name*],
[edit unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name*],
[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name*],
[edit unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging cdr-profiles *profile-name*]**, **[edit unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name*]**, **[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name*]**, and **[edit unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name*]** hierarchy levels introduced in Junos OS Mobility Release 11.4W.

**Description** Enter a description for the Charging Data Record (CDR) profile, charging profile, transport profile, or trigger profile (which can be used to capture the purpose of the profile). For example, you might have a description to differentiate the default profile from other profiles, as follows:
**This is the default profile to be used when a subscriber cannot be categorized into any other profile.**

However, make sure that the description is 255 characters or fewer.

**Options** ***string***—Description of the profile.
**Values:** Up to 255 characters

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- cdr-profiles on page 816
- charging-profiles on page 824
- transport-profiles on page 888
- trigger-profiles on page 891
- Configuring CDR Attributes on page 306
- Configuring Charging Profiles on page 308
- Configuring Transport Profiles on page 303
- Configuring Charging Trigger Events on page 304

## destination-ipv4-address (GTP Prime)

**Syntax** destination-ipv4-address *address*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp peer *peer-name*], [edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the charging gateway function (CGF) server's (GTP Prime peer's) IPv4 address, to which the Charging Data Records (CDRs) are sent as GTP Prime messages from the charging gateway function (CGF). This is a mandatory configuration.

**Options** ***address***—IPv4 address of the CGF server.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- peer (GTP Prime) on page 862
- Configuring GTP Prime Peers on page 298
- Configuring GTP Prime for Charging on page 297

## destination-port (GTP Prime)

**Syntax** destination-port *port-number*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp],
[edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp peer *peer-name*],
[edit unified-edge gateways sgw *gateway-name* charging gtpp],
[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging gtpp]** and **[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]** hierarchy levels introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the TCP or UDP port on which the charging gateway function (CGF) server listens to the GTP Prime messages sent from the charging data function (CDF).

When there are global-level and peer-level configurations, the peer-level configuration takes precedence.

**Options** ***port-number***—TCP or UDP port on which the CGF server listens to the GTP Prime messages sent from the CDF.

**Range:** 1 through 65535

**Default:** 3386

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- gtpp on page 852
- peer (GTP Prime) on page 862
- Configuring GTP Prime Peers on page 298
- Configuring GTP Prime for Charging on page 297

## direction (Trigger Profiles)

**Syntax** direction (both | uplink);

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging trigger-profiles *profile-name* offline volume-limit],
[edit unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name* offline volume-limit]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name* offline volume-limit]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Specify whether the maximum volume of data transmitted includes the data transmitted in both the uplink and downlink directions, or only in the uplink direction.

When the configured volume limit is reached, the CDR is updated with the transmitted uplink and downlink bytes and is closed.

Any change to the existing configuration does not affect a previously established session. The updated configuration applies only to new sessions.

**Default** If you do not configure the **direction** statement, then the configured volume limit includes the total volume of data transmitted in both uplink and downlink directions.

**Options** **both**—The configured volume limit must include the total volume of data transmitted in both uplink and downlink directions.

**uplink**—The configured volume limit must include the volume of data transmitted only in the uplink direction.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- volume-limit on page 895
- Configuring Charging Trigger Events on page 304
- Configuring Charging on page 287

## disable-replication

**Syntax** disable-replication;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging local-persistent-storage-options],
[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Specify that Charging Data Records (CDRs) stored on the Routing Engine disk should *not* be replicated to the standby Routing Engine. Typically, the CDRs stored on Routing Engine disk are replicated to the standby Routing Engine, as a backup.

By default, replication is enabled.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- local-persistent-storage-options on page 855
- Configuring Persistent Storage on page 299
- Configuring Charging on page 287

## disk-space-policy

**Syntax**

```
disk-space-policy {
  watermark-level-1 {
    notification-level (both | snmp-alarm | syslog);
    percentage value;
  }
  watermark-level-2 {
    notification-level (both | snmp-alarm | syslog);
    percentage value;
  }
  watermark-level-3 {
    notification-level (both | snmp-alarm | syslog);
    percentage value;
  }
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* charging local-persistent-storage-options],
[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

When you use the Routing Engine disk to store Charging Data Records (CDRs), you may want to monitor and raise alerts if the disk space falls below a configured threshold level, which enables you to take appropriate measures to prevent the loss of CDR data.

Use the statements within this hierarchy to configure the percentage of disk space you want to allocate for storage, and raise alerts when the limit is reached.

You can configure up to a maximum of three threshold levels.

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- local-persistent-storage-options on page 855
- Configuring Persistent Storage on page 299
- Configuring Charging on page 287

## down-detect-time (GTP Prime)

**Syntax** down-detect-time *duration*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp],
[edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp peer *peer-name*],
[edit unified-edge gateways sgw *gateway-name* charging gtpp],
[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging gtpp]** and **[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]** hierarchy levels introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the duration for which the charging data function (CDF) must wait for a response from the charging gateway function (CGF) server after the expiry of an n3 * t3 cycle, after which the server's status is marked Down. The CDF then sends the GTP Prime messages to the next configured CGF server in the corresponding transport profile.

When there are global-level and peer-level configurations, the peer-level configuration takes precedence.

**Options** ***duration***—Duration the CDF waits after the n3 * t3 cycle expiry before declaring a GTP Prime peer as Down. The CDF then sends the GTP Prime messages to the next configured GTP Prime peer in the corresponding transport profile.

**Range:** 0 through 255 seconds

**Default:** 10 seconds

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- gtpp on page 852
- peer (GTP Prime) on page 862
- Configuring GTP Prime Peers on page 298
- Configuring GTP Prime for Charging on page 297
- Configuring Charging on page 287

## echo-interval (GTP Prime)

**Syntax** echo-interval *duration*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp],
[edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp peer *peer-name*],
[edit unified-edge gateways sgw *gateway-name* charging gtpp],
[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging gtpp]** and **[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]** hierarchy levels introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the number of seconds that the charging data function (CDF) must wait before sending an echo request message to the charging gateway function (CGF) server.

Echo messages are:

- Sent only for UDP connections.
- Not sent more than once in a minute.

When there are global-level and peer-level configurations, the peer-level configuration takes precedence.

**Options** ***duration***—Number of seconds that the CDF waits before sending an echo request message to the CGF server.

**Range:** 60 through 255 seconds

**Default:** 60 seconds

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- gtpp on page 852
- peer on page 862
- Configuring GTP Prime Peers on page 298
- Configuring GTP Prime for Charging on page 297
- Configuring Charging on page 287

## enable-reduced-partial-cdrs

**Syntax** enable-reduced-partial-cdrs;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging cdr-profiles *profile-name*], [edit unified-edge gateways sgw *gateway-name* charging cdr-profiles *profile-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging cdr-profiles *profile-name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Enable the generation of reduced partial Charging Data Records (RPCs). RPCs contain mandatory fields as well as information regarding changes in the session parameters relative to the previous CDR. For example, if the user equipment location has not changed, then this information is excluded from the RPC because this information has not changed from the previous CDR.

**Default** If this statement is not configured, the generation of fully qualified partial CDR (FQPC) is supported. FQPC contains all the mandatory and conditional fields, as well as those fields that the public land mobile network (PLMN) operator has provisioned to be included in the CDR.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- cdr-profiles on page 816
- Configuring CDR Attributes on page 306
- Configuring Charging on page 287

## exclude (Trigger Profiles)

**Syntax**

```
exclude {
    ms-timezone-change;
    plmn-change;
    qos-change;
    rat-change;
    sgsn-mme-change; #S-GW only
    sgsn-sgw-change; #P-GW only
    user-location-change;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* charging trigger-profiles *profile-name* offline],
[edit unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name* offline]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name* offline]** hierarchy level and the **sgsn-mme-change** option introduced in Junos OS Mobility Release 11.4W.

**Description**

Certain signal message updates to the packet data protocol (PDP) context or bearer trigger charging updates. However, using the statements in this hierarchy, you can choose not to record these updates in the Charging Data Record (CDR).

For example, a quality-of-service (QoS) change results in a container being added to the CDR. However, the container is not added if you configure to ignore this change, using one of the following commands, as applicable:

- **set unified-edge gateways ggsn-pgw *gateway-name* charging trigger-profiles *profile-name* exclude qos-change** for the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW).
- **set unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name* exclude qos-change** for the Serving Gateway (S-GW).

You may have configured certain information elements (IEs) to be excluded from the CDR using the statements at the **[edit unified-edge gateways ggsn-pgw *gateway-name* charging cdr-profiles *profile-name* exclude-ie-options]** or the **[edit unified-edge gateways sgw *gateway-name* charging cdr-profiles *profile-name* exclude-ie-options]** hierarchy levels. Irrespective of this configuration, some of the IEs are to the CDR if the corresponding triggering event is not disabled. The following table lists the triggers and the corresponding IEs.

Table 59: Triggers and Corresponding IEs

| Trigger | IE |
|---|---|
| **ms-timezone-change** | Mobile Station (MS) time zone |
| **plmn-change** | Serving node PLMN identifier |
| **rat-change** | RAT type |
| **user-location-change** | User location information |

**Options**

NOTE: The following options are applicable to both GGSN or P-GW and S-GW CDRs unless otherwise specified.

- **ms-timezone-change**—If configured, excludes charging data updates to the CDR when there is a change in the MS time zone. Otherwise, when an MS time zone change occurs, the CDR is updated with the charging information and is closed.
- **plmn-change**—If configured, excludes charging data updates to the CDR when there is a PLMN change. Otherwise, when a public land mobile network (PLMN) change occurs, the CDR is updated with the charging information and is closed.
- **qos-change**—If configured, excludes charging data updates to the CDR when there is a QoS change. Otherwise, a container is added to the CDR when there is a QoS change.
- **rat-change**—If configured, excludes charging data updates to the CDR when there is a RAT change.Otherwise, when a Radio Access Technology (RAT) change occurs, the CDR is updated with the charging information and is closed.
- **sgsn-mme-change**—(S-GW only) If configured, excludes charging data updates to the CDR when the SGSN or Mobility Management Entity (MME) changes reach the maximum configured limit (determined by the value set for the **sgsn-mme-change-limit** parameter). Otherwise, when the SGSN or MME changes reach the maximum configured limit, the CDR is updated and closed.
- **sgsn-sgw-change**—(GGSN or P-GW only) If configured, excludes charging data updates to the CDR when the SGSN or S-GW changes reach the maximum configuration limit (determined by the value set for the **sgsn-sgw-change-limit** parameter). Otherwise, when the SGSN or S-GW changes reach the maximum configured limit, the CDR is updated and closed.
- **user-location-change**—If configured, excludes charging data updates to the CDR when there is a change in user location. Otherwise, when a change in the user location information (such as E-UTRAN cell global identifier [ECGI], Tracking Area Identity [TAI], Routing Area Identity [RAI], SAI [Service Area identity], Location Area Identity [LAI], or Cell Global Identity [CGI]) occurs, the open containers are closed and added to the CDR.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- offline on page 861
- Configuring Charging Trigger Events on page 304
- Configuring Charging on page 287

## exclude-ie-options

**Syntax**

```
exclude-ie-options {
  apn-ni;
  apn-selection-mode;
  cc-selection-mode;
  dynamic-address;
  list-of-service-data;
  list-of-traffic-volumes;
  lrsn;
  ms-time-zone;
  network-initiation;
  node-id;
  pdn-connection-id;
  pdppdn-type;
  pgw-address-used; # S-GW only
  pgw-plmn-identifier;
  rat-type;
  record-sequence-number;
  served-imeisv;
  served-msisdn;
  served-pdppdn-address;
  serving-node-plmn-identifier;
  sgw-change; # S-GW only
  start-time;
  stop-time;
  user-location-information;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging cdr-profiles *profile-name*], [edit unified-edge gateways sgw *gateway-name* charging cdr-profiles *profile-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
**pgw-address-used** and **sgw-change** options and support for them at the **[edit unified-edge gateways sgw *gateway-name* charging cdr-profiles *profile-name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** The mobile operator can provision certain optional information elements (parameters) to be excluded from the Charging Data Record (CDR). Use this statement to configure the information elements (IEs) that are to be excluded from the CDR. By default, all informational elements are included in the CDR.

CAUTION: Some of the IEs are added to the CDR irrespective of whether or not you have configured them to be excluded, if the corresponding triggering events are enabled. The **ms-time-zone**, **serving-node-plmn-identifier**, **rat-type**, and **user-location-information** IEs are added to the CDR, unless the corresponding **ms-timezone-change**, **plmn-change**, **rat-change**, and **user-location-change** triggering events are explicitly disabled using the statements under the **trigger-profiles** > **exclude** hierarchy level.

Options

NOTE: The following options are applicable to both the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW) and Serving Gateway (S-GW) CDRs unless otherwise specified.

- **apn-ni**—The Access Point Name Network Identifier (APN-NI) defines the external network to which the user wants to connect to through the GGSN.
- **apn-selection-mode**—Indicates the origin of the APN and whether or not the Home Location Register (HLR) or Home Subscriber Server (HSS) has verified the user's subscription. The possible values for this mode are:
  - **Mobile Station**—MS-provided APN, subscription not verified.
    Indicates that the Mobile Station (MS) provided the APN and that the HLR or HSS did not verify the user's subscription to the network.
  - **Network**—Network-provided APN, subscription not verified.
    Indicates that the network provided a default APN because the MS did not provide an APN, and that the HLR or HSS did not verify the user's subscription to the network.
  - **Verified**—MS or network-provided APN, subscription verified.
    Indicates that the MS or the network provided the APN and that the HLR or HSS verified the user's subscription to the network.
- **cc-selection-mode**—Indicates the type of charging characteristic that the GGSN or P-GW applies to the CDR: **Home**, **Visiting**, **Roaming**, or **SGSN/S-GW supplied**.
- **dynamic-address**—This field, if present in the CDR, indicates that the packet data protocol (PDP) address has been dynamically allocated for the specific PDP context.
- **list-of-service-data**—This list includes one or more containers and each of the container includes a list of fields which records information about the volume of data transmitted in bytes in the uplink and downlink directions, quality-of-service (QoS) changes, and so on. For the complete list, refer to the 3GPP 32.298 v 8.7.0 technical specification.
- **list-of-traffic-volumes**—This list includes one or more containers and each container includes a list of fields which records information about the volume of data transmitted, in bytes, in the uplink and downlink directions, the reason for closing the container, when the container is closed, and the location of the user equipment when this data transmission occurs.

  This IE element is applicable for CDRs that are compliant with the 3GPP R7 and R99 release specifications, only.
- **lrsn**—The Local Record Sequence Number (LRSN) is a unique and sequential number generated by the network node (GGSN or P-GW) and is assigned to the CDRs for tracking any missing billing records.
- **ms-time-zone**—Mobile Station (MS) time zone.

  This IE is added to the CDR, irrespective of whether or not you have configured it to be excluded, if the **ms-timezone-change** triggering event is enabled. See **exclude** to disable this triggering event.

This IE is applicable for CDRs that are compliant with the 3GPP R7 and R8 release specifications, only.

- **network-initiation**—This field, if present in the CDR, indicates that the PDP context is network initiated.

  This information element is applicable for CDRs that are compliant with the 3GPP R7 and R99 release specifications, only.

- **node-id**—ID of the network element node that generates the CDR.

  In the MX Series router, the node-id is *ggsn/pgw-ip-address:virtual-spic-id*.

- **pdn-connection-id**—This ID uniquely identifies different records belonging to the same Packet Data Network (PDN) connection. This field includes the charging ID of the first IP-CAN bearer activated within the PDN connection. Together with the P-GW address, it uniquely identifies the PDN connection.

  This information element is applicable for CDRs that are compliant with the 3GPP R8 release specification, only.

- **pdppdn-type**—Both PDP Type and PDN Type define the end-user protocol used between the external PDN and the MS.

  This information element is applicable for CDRs that are compliant with the 3GPP R8 release specification, only.

- **pgw-address-used**—Exclude the P-GW address-used IE from the CDR. This option is applicable only to the S-GW.

- **pgw-plmn-identifier**—P-GW PLMN identifier (mobile country code and mobile network code).

  This information element is applicable for CDRs that are compliant with the 3GPP R8 and R99 release specifications, only.

- **rat-type**—The Radio Access Technology (RAT) type used by the MS: eUTRAN, GERAN, WLAN, GAN, HSPA Evolution, or evolved High Rate Packet Data (eHRPD).

  This IE is added to the CDR, irrespective of whether or not you have configured it to be excluded, if the **rat-change** triggering event is enabled. See **exclude** to disable this triggering event.

  This information element is applicable for CDRs that are compliant with the 3GPP R7 and R8 release specifications, only.

- **record-sequence-number**—A sequential number assigned to each partial CDR of a particular PDP context or IP-CAN bearer. This number is not assigned, if there is only one CDR generated during the lifetime of a subscriber.

- **served-imeisv**—The International Mobile Station Equipment Identity and Software Version Number (IMEISV) IE of the served mobile equipment (ME).

- **served-msisdn**—The MSISDN number of the served equipment.

- **served-pdppdn-address**—The served PDP context or IP-CAN bearer address IE.

- **serving-node-plmn-identifier**—The serving node (SGSN or S-GW) PLMN identifier (mobile country code and mobile network code).

  This IE is added to the CDR, irrespective of whether or not you have configured it to be excluded, if the **plmn-change** triggering event is enabled. See exclude to disable this triggering event.

  This information element is applicable for CDRs that are compliant with the 3GPP R8 release specification, only.

- **sgw-change**—Exclude the S-GW change IE from the CDR. This option is applicable only to the S-GW.

- **start-time**—Time when the IP-CAN session is established at the P-GW for the first bearer in this session.

  This information element is applicable for CDRs that are compliant with the 3GPP R8 release specification, only.

- **stop-time**—Time when the user IP-CAN session is terminated for the last bearer in this session.

  This information element is applicable for CDRs that are compliant with the 3GPP R8 release specification, only.

- **user-location-information**—The location of the user equipment during the service data container recording interval is excluded. If this IE is excluded from the container, then it is also excluded from the CDR.

  This IE is added to the CDR, irrespective of whether or not you have configured it to be excluded, if the **user-location-change** triggering event is enabled. See exclude to disable this triggering event.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- cdr-profiles on page 816
- Configuring CDR Attributes on page 306
- Configuring Charging on page 287

## file-age

**Syntax**

```
file-age {
  age;
  disable;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* charging local-persistent-storage-options],
[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
**disable** statement and support at the **[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

Configure the duration, in minutes, after which the temporary Charging Data Record (CDR) log file is closed and moved to a final location within the same disk (**/opt/mobility/charging/ggsn/final_log**), from where it can be transferred using SSH FTP (SFTP).

Files transferred from the final location should be deleted from the local Routing Engine disk after the transfer. Only authorized users can transfer and delete the files (after the transfer). However, any one of the following conditions (whichever comes first) must be met before the files are moved from the temporary location to the final location:

- The age of the file reaches the configured or default limit.
- The size of the file reaches the configured or default limit.
- The number of CDRs per file reaches the configured or default limit.

NOTE: **The default limit is applicable only if you have not configured any value.**

**Default**

If you do not configure this statement, then the trigger based on file age is enabled by default.

**Options**

***age***—Duration, in minutes, after which a CDR file is closed and moved to a final location within the Routing Engine disk, from where it can be transferred using SFTP.

**Range:** 20 through 7200 minutes

**Default:** 120 minutes

**disable**—Disable the file age trigger.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Persistent Storage on page 299
- Configuring Charging on page 287
- local-persistent-storage-options on page 855

## file-creation-policy

**Syntax** file-creation-policy (shared-file | unique-file);

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging local-persistent-storage-options],
[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure whether Charging Data Records (CDRs) generated for a specific transport profile from all the services PICs should be routed to a single temporary file (**shared-file** option) or to multiple files, with each file storing CDRs generated from a single services PIC (**unique-file** configuration).

**Default** If you do not include the **file-creation-policy** statement, CDRs from all the services PICs are routed to a single temporary file (**shared-file** option)

**Options**

**shared-file**—CDRs are routed to the files based on the file-routing criteria of the transport profile. In this configuration, all the CDRs generated for a specific transport profile from all the services PICs are routed to a single CDR temporary file. When a file trigger, such as file size, file age, or CDR count, triggers temporary file closure, the files are moved to the final CDR location (**/opt/mobility/charging/ggsn/final_log**). This is the default.

**unique-file**—CDRs are routed to the files based on the file routing criteria of the transport profile. In this configuration, all the CDRs generated for a specific transport profile from each services PIC are routed to a separate CDR temporary file. When a file trigger, such as file size, file age, or CDR count, triggers temporary file closure, the files are moved to a final CDR location (**/opt/mobility/charging/ggsn/final_log**).

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- local-persistent-storage-options on page 855
- Configuring Persistent Storage on page 299
- Configuring Charging on page 287

## file-format

**Syntax** file-format (3gpp | raw-asn);

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging local-persistent-storage-options],
[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the file format for Charging Data Records (CDRs) stored in the CDR log files.

**Default** If you do not include the **file-format** statement, the CDRs are stored in a format compliant with the 3GPP 32297 technical specification release (**3gpp** option).

**Options**

**3gpp**—CDRs are stored in a format that is compliant with the 3GPP 32297 technical specification release.

**raw-asn**—CDRs are stored in raw Abstract Syntax Notation One (ASN.1) format.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- local-persistent-storage-options on page 855
- Configuring Persistent Storage on page 299
- Configuring Charging on page 287

## file-name-private-extension

**Syntax** file-name-private-extension *string*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging local-persistent-storage-options],
[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Specify a private extension (string) that is appended to the filenames.

NOTE: The filenaming format is as follows, which is compliant with the Third-Generation Partnership Project (3GPP) 32.297 technical release specification:
*NodeID_-_RC.date_-_time*[*.PI*][*.FE*]

- NodeID—Name of the host that generated the file (*Host_Name_Gateway_Name*).
- RC—A running counter, starting at 1.
- date—Date when the CDR file was closed in *YYYYMMDD* (year, month, day) format.
- time—Time when the CDR file was closed in *HHMMshhmm* format.
  - *HHMM* indicates the local time (hours and minutes) in a 24-hour format.
  - *s* indicates the sign of the local time differential from the UTC (+ or -). If the time differential to the UTC is 0, then the sign can be arbitrarily set to + or -.
  - *hhmm* indicates the time differential (hours and minutes) from the UTC.
- PI—Optional private extension.
- FE—Optional file extension.

**Options** *string*—Private extension.
**Values:** 1 through 16 bytes

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- local-persistent-storage-options on page 855

- Configuring Persistent Storage on page 299
- Configuring Charging on page 287

## file-size

**Syntax**

```
file-size {
  size;
  disable;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* charging local-persistent-storage-options],
[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
**disable** statement and support at the **[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

Configure maximum size that the file can reach, in MB, after which the temporary Charging Data Record (CDR) log file is closed and moved to a final location within the same disk (**/opt/mobility/charging/ggsn/final_log**), from where it can be transferred using SSH FTP (SFTP).

Files transferred from the final location should be deleted from the local Routing Engine disk after the transfer. Only authorized users can transfer and delete the files (after the transfer). However, any one of the following conditions (whichever comes first) must be met before the files are moved from the temporary location to the final location:

- Size of the file reaches the configured or default limit.
- Age of the file reaches the configured or default limit.
- Number of CDRs per file reaches the configured or default limit.

NOTE: **The default limit is applicable only if you have not configured any value.**

**Default**

If you do not configure this statement, then the trigger based on file size is enabled by default.

**Options**

***value***—Maximum size that the CDR file can reach, in MB, after which it is closed and moved to a final location within the Routing Engine disk, from where it can be transferred using SFTP.

**Range:** 1 MB to 1024 MB

**Default:** 10 MB

**disable**—Disable the file size trigger.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Persistent Storage on page 299
- Configuring Charging on page 287
- local-persistent-storage-options on page 855

## global-profile (Serving Gateway)

**Syntax**

```
global-profile {
  default-profile default-profile;
  home-profile home-profile;
  profile-selection-order [profile-selection-method];
  roamer-profile roamer-profile;
  visitor-profile visitor-profile;
}
```

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name* charging]

**Description** Configure the global (charging) profiles that will be applicable for the Serving Gateway (S-GW). This is a mandatory configuration if you want to enable charging on the S-GW. Configuring the **profile-selection-order** statement is mandatory if the **global-profile** statement is configured.

The S-GW determines the type of subscriber by using the mobile country code (MCC) and the mobile network code (MNC) values in the Create Session Request message from the subscriber's user equipment (UE) and compares these with the corresponding values configured for the home public land mobile network (HPLMN). Depending on whether a subscriber is a home subscriber, a visitor, or a roamer, the **home-profile**, **visitor-profile**, or **roamer-profile** is applied. If the applicable profile is not configured, then the **default-profile**, if configured, is applied. If **default-profile** is also not configured, then the subscriber session is created with no charging applied.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- charging on page 819

## gtpp

**Syntax**

```
gtpp {
  destination-port port-number;
  down-detect-time duration;
  echo-interval duration;
  header-type (long | short);
  n3-requests requests;
  no-path-management;
  pending-queue-size value;
  peer peer-name {
    destination-ipv4-address address;
    destination-port port-number;
    down-detect-time duration;
    echo-interval duration;
    header-type (long | short);
    n3-requests requests;
    no-path-management;
    pending-queue-size value;
    reconnect-time duration;
    source-interface interface-name [ipv4-address address];
    t3-response response-interval;
    transport-protocol (tcp | udp);
    version (v0 | v1 | v2);
  }
  reconnect-time duration;
  source-interface {
    interface-name;
    [ipv4-address address;
  }
  t3-response response-interval;
  transport-protocol (tcp | udp);
  version (v0 | v1 | v2);
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging],
[edit unified-edge gateways sgw *gateway-name* charging]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** The statements in this hierarchy enable you to set global as well as unique configurations for the general packet radio service (GPRS) tunneling protocol Prime (GTP Prime) peers (Charging Gateway Function [CGF] servers). If no separate configuration is defined for a peer, then the global configurations apply for that peer.

The charging data function (CDF) sends the Charging Data Records (CDRs) as GTP Prime messages to the GTP Prime peer, based on this configuration.

The remaining statements are explained separately.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- charging on page 819
- Configuring GTP Prime for Charging on page 297
- Configuring GTP Prime Peers on page 298
- Configuring Charging on page 287

## header-type (GTP Prime)

**Syntax**
header-type (long | short);

**Hierarchy Level**
[edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp],
[edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp peer *peer-name*],
[edit unified-edge gateways sgw *gateway-name* charging gtpp],
[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]

**Release Information**
Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging gtpp]** and **[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]** hierarchy levels introduced in Junos OS Mobility Release 11.4W.

**Description**
Configure the charging data function (CDF) GTP Prime message header length to match the version supported on the charging gateway function (CGF) server, which can be set to either short (6 bytes) or long (20 bytes). The **long** format is supported only in GTP Prime version 0. GTP Prime versions 1 and 2 support the **short** header length only.

When there are global-level and peer-level configurations, the peer-level configuration takes precedence.

**Options**
**long**—CDF GTP Prime message header length is set to 20 bytes.

**short**—CDF GTP Prime message header length is set to 6 bytes.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- gtpp on page 852
- peer (GTP Prime) on page 862
- Configuring GTP Prime for Charging on page 297
- Configuring GTP Prime Peers on page 298
- Configuring Charging on page 287

## home-profile

**Syntax** home-profile *home-profile*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* charging], [edit unified-edge gateways sgw *gateway-name* charging global-profile]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging global-profile]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the profile that should be used to charge home subscribers. If the **profile-selection-order** configuration indicates **static**, then this profile is used for home subscribers.

NOTE: **The charging profile must already be configured on the broadband gateway.**

The broadband gateway determines whether the subscriber is a home subscriber by using the mobile country code (MCC) and the mobile network code (MNC) values in the Create Session Request message from the subscriber's user equipment (UE). If the subscriber's International Mobile Subscriber Identity (IMSI), MCC, and MNC belong to the same PLMN to which both the GGSN or P-GW and the S-GW belong, then the subscriber is deemed a home subscriber and the **home-profile** is applied. If the **home-profile** is not configured, then the **default-profile**, if configured, is applied. If the **default-profile** is also not configured, then the subscriber session is created with no charging applied.

**Options** ***home-profile***—Name of the home profile.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- charging (APN) on page 739
- charging-profiles on page 824
- global-profile (Serving Gateway) on page 851

## local-persistent-storage-options

**Syntax**

```
local-persistent-storage-options {
  cdrs-per-file value;
  disable-replication;
  disk-space-policy {
    watermark-level-1 {
      notification-level (both | snmp-alarm | syslog);
      percentage value;
    }
    watermark-level-2 {
      notification-level (both | snmp-alarm | syslog);
      percentage value;
    }
    watermark-level-3 {
      notification-level (both | snmp-alarm | syslog);
      percentage value;
    }
  }
  file-age {
    age;
    disable;
  }
  file-creation-policy (shared-file | unique-file);
  file-format (3gpp | raw-asn);
  file-name-private-extension string;
  file-size {
    size;
    disable;
  }
  traceoptions {
    file file-name <files number> <match regular-expression> <no-world-readable |
      world-readable> <size size> ;
    flag flag;
    level (all | critical | error | info | notice | verbose | warning);
    no-remote-trace;
  }
  user-name string;
  world-readable;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging],
[edit unified-edge gateways sgw *gateway-name* charging]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the Charging Data Record (CDR) file storage options, which are measures to prevent loss of the CDR data.

You typically store the CDRs on the local Routing Engine disk when you do not have any external charging gateway function (CGF) servers configured to store them or when all the CGF servers are down.

When you choose to store the CDRs locally, the CDRs generated by the services PICs are routed to a file on the Routing Engine disk. Some of the options that can be configured include the following:

- Action to be taken when the disk space falls below the configured watermark level.
- Restricting access to the files to a specific user.
- File routing criteria—CDRs are routed to the files based on the file-routing criteria of the transport profile. Therefore, all CDRs generated for a given transport profile are saved in a specific CDR log file.

The remaining statements are explained separately.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- charging on page 819
- Configuring Persistent Storage on page 299
- Configuring Charging on page 287

## local-storage

**Syntax**
local-storage;

**Hierarchy Level**
[edit unified-edge gateways ggsn-pgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways persistent-storage-order],
[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways persistent-storage-order]

**Release Information**
Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways persistent-storage-order]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**
Configure the Routing Engine disk as backup storage for the Charging Data Records (CDRs) when the external storage resources (charging gateway function [CGF] servers) are down or if no external servers are configured.

**Default**
If you do not include the **local-storage** statement, the backup storage is disabled.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- persistent-storage-order on page 866
- Configuring Persistent Storage on page 299
- Configuring Charging on page 287

## mtu (Transport Profiles)

**Syntax** mtu *value*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways],
[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the maximum transmission unit (MTU) for a Data Record Transfer (DRT) message, which represents the maximum size in bytes that a DRT message can reach before it is transmitted.

A DRT message containing the Charging Data Records (CDRs) is transmitted from the charging data function (CDF) to the charging gateway function (CGF) server, when the **cdr-aggregation-limit** or the **mtu** size is reached (whichever comes first).

**Options** **value**—Maximum size, in bytes, for a DRT message.

**Range:** 300 through 8000 bytes

**Default:** 1500 bytes

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- charging-gateways on page 823
- Configuring Transport Profiles on page 303
- Configuring Charging on page 287

## n3-requests (GTP Prime)

**Syntax** n3-requests *requests*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp],
[edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp peer *peer-name*],
[edit unified-edge gateways sgw *gateway-name* charging gtpp],
[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging gtpp]** and **[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]** hierarchy levels introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the maximum number of times the charging data function (CDF) attempts to send echo request messages to the charging gateway function (CGF) server, after which the CDF waits for a configured duration (see down-detect-time) for any response before declaring the server as Down.

The broadband gateway retransmits the requests to the UDP peers. However, for the TCP peers, the requests are retransmitted to a newer peer (when there is a switchover) or to the same peer (when it becomes alive after being Down).

When there are global-level and peer-level configurations, the peer-level configuration takes precedence.

**Options** ***requests***—Number of times that the CDF attempts to send a request to a CGF server after which the CDF waits for a configured duration (see down-detect-time) before declaring the server as Down.

**Range:** 1 through 5

**Default:** 3

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- gtpp on page 852
- peer (GTP Prime) on page 862
- Configuring GTP Prime for Charging on page 297
- Configuring GTP Prime Peers on page 298
- Configuring Charging on page 287

## no-path-management (GTP Prime)

**Syntax** no-path-management;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp],
[edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp peer *peer-name*],
[edit unified-edge gateways sgw *gateway-name* charging gtpp],
[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging gtpp]** and **[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]** hierarchy levels introduced in Junos OS Mobility Release 11.4W.

**Description** Use this statement to disable path management messages. If this statement is configured, no echo messages are sent. However, the router responds to any echo messages that are received.

NOTE:

- Path management refers to the exchange of echo messages between charging data function (CDF) and charging gateway function (CGF) servers (GTP Prime peers) to find out whether a CGF server is alive to process the GTP Prime messages sent from the CDF.
- Echo messages are sent only for UDP connections.

When there are global-level and peer-level configurations, the peer-level configuration takes precedence.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- gtpp on page 852
- peer (GTP Prime) on page 862
- Configuring GTP Prime for Charging on page 297
- Configuring GTP Prime Peers on page 298
- Configuring Charging on page 287

## offline (Transport Profiles)

**Syntax**

```
offline {
  charging-gateways {
    cdr-aggregation-limit value;
    cdr-release (r7 | r8 | r99);
    mtu value;
    peer-order {
      [peer charging-gateway-peer-name];
    }
    persistent-storage-order {
      local-storage;
    }
    switch-back-time seconds;
  }
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* charging transport-profiles *profile-name*],
[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name*]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

Configure the transport parameters for offline charging records, such as:

- The charging gateway peers that store the CDRs.
- The maximum Charging Data Records (CDRs) that can be added to a Data Record Transfer (DRT) message.
- The maximum transmission unit of a DRT message.
- The generated CDRs to be compliant with a specific 3GPP release.
- The duration that the charging data function (CDF) waits before transmitting the CDRs to a peer that has recently come up and has the highest priority among all the peers, which are alive.
- Whether to use the local Routing Engine disk for CDR storage.

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- transport-profiles on page 888
- Configuring Transport Profiles on page 303
- Configuring Charging on page 287

## offline (Trigger Profiles)

**Syntax**

```
offline {
  container-limit value;
  exclude {
    ms-timezone-change;
    plmn-change;
    qos-change;
    rat-change;
    sgsn-mme-change; #S-GW only
    sgsn-sgw-change; #P-GW only
    user-location-change;
  }
  sgsn-mme-change-limit value; #S-GW only
  sgsn-sgw-change-limit value; #P-GW only
  time-limit value;
  volume-limit {
    value;
    direction (both | uplink);
  }
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging trigger-profiles *profile-name*], [edit unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the attributes that trigger charging updates for offline charging records.

For example, you can set the maximum duration that the Charging Data Record (CDR) can remain open (**time-limit**), maximum volume of data that can be transmitted before closing a CDR (**volume-limit**), maximum number of containers that can be added to a CDR, or maximum number of Serving Gateway (S-GW) or serving GPRS support node (SGSN) changes that can occur before the CDR is updated and closed.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- trigger-profiles on page 891
- Configuring Charging Trigger Events on page 304
- Configuring Charging on page 287

## peer (GTP Prime)

**Syntax**

```
peer peer-name {
  destination-ipv4-address address;
  destination-port port-number;
  down-detect-time duration;
  echo-interval duration;
  header-type (long | short);
  n3-requests requests;
  no-path-management;
  pending-queue-size value;
  reconnect-time duration;
  source-interface {
    interface-name;
    ipv4-address address;
  }
  t3-response response-interval;
  transport-protocol (tcp | udp);
  version (v0 | v1 | v2);
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp],
[edit unified-edge gateways sgw *gateway-name* charging gtpp]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging gtpp]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

Configure GTP Prime peers (charging gateway function [CGF] servers). You can configure up to a maximum of 24 peers. The charging data function (CDF) sends the Charging Data Records (CDRs) as GTP Prime messages to the GTP Prime peer, based on this configuration.

When there are global-level and peer-level configurations, the peer-level configuration takes precedence.

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- gtpp on page 852
- Configuring GTP Prime Peers on page 298
- Configuring GTP Prime for Charging on page 297
- Configuring Charging on page 287

## peer (Peer Order)

**Syntax** peer *charging-gateway-peer-name*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways peer-order],
[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways peer-order]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways peer-order]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the name of the charging gateway peer. However, make sure the peer that you specify here is previously configured for its IP address, name, and so on, using one of the following statements, as applicable. Otherwise, you will encounter a configuration error.

- **set unified-edge gateways ggsn-pgw *gateway-name* charging gtpp peer** for the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW).
- **set unified-edge gateways sgw *gateway-name* charging gtpp peer** for the Serving Gateway (S-GW).

**Options** ***charging-gateway-peer-name***—Name of the charging gateway server.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- peer-order on page 864
- Configuring GTP Prime Peers on page 298
- Configuring GTP Prime for Charging on page 297
- Configuring Charging on page 287

## peer-order

**Syntax**

```
peer-order {
  [peer charging-gateway-peer-name];
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways],
[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

Configure the charging gateway function (CGF) servers. You can configure up to a maximum of three servers for a transport profile.

When multiple CGF servers are available for storing Charging Data Records (CDRs), the charging data function (CDF) needs to identify the server to which to route the CDRs first. The peer order determines this hierarchy using which the CDF tries to send the CDRs to the server that comes first in this order. The peer that comes first in the order is treated as the highest-priority peer. At any given time, CDRs are sent to only one of the peers and not to all. If for any reason the first server goes down, the CDF tries to send the CDRs to the server that comes next in the order. However, if a higher-priority peer comes up, the CDRs are sent to this peer after a waiting period determined by the **switch-back-time** configuration.

When required, the priority of any peer can be changed by using the configuration option to **insert before** or **insert after** the existing peers.

NOTE: If all the peers are Down and if you have configured the Routing Engine disk as the backup storage option, then the CDRs are routed to the Routing Engine disk. However, if one or multiple peers come alive, then CDF waits for the configured **switch-back-time** duration and routes the CDRs to the highest priority peer that is alive after this duration. The CDRs that were getting stored previously on the Routing Engine disk are not routed to the charging gateway (peer) and remain on the disk. You need to transfer the CDRs using SSS FTP (SFTP) from the following location on the disk: **/opt/mobility/charging/ggsn/final_log**.

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- charging-gateways on page 823
- Configuring GTP Prime Peers on page 298
- Configuring GTP Prime for Charging on page 297
- Configuring Charging on page 287

## pending-queue-size (GTP Prime)

**Syntax** pending-queue-size *value*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp],
[edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp peer *peer-name*],
[edit unified-edge gateways sgw *gateway-name* charging gtpp],
[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging gtpp]** and **[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]** hierarchy levels introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the maximum number of Data Record Transfer (DRT) messages that can be sent by the charging data function (CDF) without an acknowledgement from the charging gateway function (CGF) server. When the limit is reached, CDF stops sending the messages to that CGF server.

When there are global-level and peer-level configurations, the peer-level configuration takes precedence.

**Options** ***value***—Maximum number of DRT messages that can be queued without an acknowledgement from the CGF server.

**Range:** 1 through 4096

**Default:** 1024

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- gtpp on page 852
- peer (GTP Prime) on page 862
- Configuring GTP Prime Peers on page 298
- Configuring GTP Prime for Charging on page 297
- Configuring Charging on page 287

## persistent-storage-order

**Syntax**

```
persistent-storage-order {
    local-storage;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways],
[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

Configure the local storage of Charging Data Records (CDRs). You may want to store the CDRs on the local Routing Engine disk for one of the following reasons:

- When there are no charging gateway peers configured for a transport profile
- When none of the primary, secondary, or tertiary charging gateway peers can be reached (that is, when they are down)

The remaining statement is explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- charging-gateways on page 823
- Configuring Transport Profiles on page 303
- Configuring Charging on page 287

## profile-id

**Syntax** profile-id *id-num*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging charging-profiles *profile-name*],
[edit unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure a unique identifier to be associated with a charging profile. It can range from 1 through 255. This is a mandatory configuration.

Based on the user subscription, the Serving Gateway (S-GW), serving GPRS support node (SGSN), or RADIUS server returns the charging profile (identified by the profile ID) that must be used for charging the mobile subscriber. If more than one server returns a profile ID, then the profile selection order configuration determines which server's profile ID must be given higher priority. This profile ID is then matched with the profile-id that you have configured to choose the correct charging profile for that subscriber. However, if a server returns an incorrect or unconfigured charging profile ID, the profile ID returned by the server, which is next in priority, is taken into consideration. If none of the profile IDs match, then charging is disabled for the customer.

NOTE: The RADIUS server returns the profile-id as a four-byte hexadecimal value in the access accept message.

**Options** *id-num*—A unique number to be associated with a charging profile.

**Range:** 1 through 65534

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- charging-profiles on page 824
- Configuring Charging Profiles on page 308
- Charging Profiles on page 285
- Configuring Charging on page 287

## profile-selection-order (Serving Gateway)

**Syntax** profile-selection-order [*profile-selection-method*];

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name* charging global-profile]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the order of the methods used to select a charging profile applicable for a subscriber's session on the Serving Gateway (S-GW). You can specify a maximum of three profile selection methods: **static**, **serving**, or **pgw-cg-addr**. If the first choice is not available, then the next choice is considered, and so on.

For example, consider a scenario where the profile selection order is **static**, **serving**, and **pgw-cg-addr**. Since **static** is the first choice, the global (charging) profiles specified are used. If the global profiles are not configured, then the next choice (**serving**) is considered. If the serving GPRS support node (SGSN) or S-GW does not provide a charging profile ID in the charging characteristics information element (IE) within the GPRS tunneling protocol (GTP) Create Session message, then the next choice (**pgw-cg-addr**) is considered. With the **pgw-cg-addr** option, the charging profile is selected based on the IP address of the charging gateway (CG) for the P-GW.

NOTE: **If the charging profile cannot be selected by any of the methods specified, then charging is disabled for that subscriber.**

**Options** *profile-selection-method*—One or more profile selection methods, listed in the order in which they should be tried. The method can be one or more of the following:

- **pgw-cg-addr**—Use the charging profile based on the on the IP address of the CG for the P-GW.
- **serving**—Use the charging profile sent by the SGSN or the Serving Gateway (S-GW).
- **static**—Use the charging profile configured locally for the S-GW.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- global-profile (Serving Gateway) on page 851

## reconnect-time (GTP Prime)

**Syntax** reconnect-time *duration*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp],
[edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp peer *peer-name*],
[edit unified-edge gateways sgw *gateway-name* charging gtpp],
[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging gtpp]** and **[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]** hierarchy levels introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the duration (in seconds) that the charging data function (CDF) must wait before trying to reconnect to a charging gateway function (CGF) server that was marked Down earlier.

When there are global-level and peer-level configurations, the peer-level configuration takes precedence.

**Options** ***duration***—Duration after which the CDF tries to reconnect to a CGF server that was previously down.

**Range:** 60 through 255 seconds. Enter 0 if you do not want to attempt to reconnect to a peer.

**Default:** 60 seconds

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- gtpp on page 852
- peer (GTP Prime) on page 862
- Configuring GTP Prime Peers on page 298
- Configuring GTP Prime for Charging on page 297
- Configuring Charging on page 287

## roamer-profile

**Syntax** roamer-profile *roamer-profile*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* charging], [edit unified-edge gateways sgw *gateway-name* charging global-profile]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging global-profile]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the profile that should be used to charge roaming subscribers. If the **profile-selection-order** configuration indicates **static**, then this profile is used for roaming subscribers.

NOTE: **The charging profile must already be configured on the broadband gateway.**

The broadband gateway determines whether the subscriber is a roamer by using the mobile country code (MCC) and the mobile network code (MNC) values in the Create Session Request message from the subscriber's user equipment (UE). If the subscriber's International Mobile Subscriber Identity (IMSI), MCC, and MNC belong to the same PLMN as the GGSN or P-GW, but the S-GW belongs to a different PLMN, then the subscriber is deemed a roamer and the **roamer-profile** is applied. If the **roamer-profile** is not configured, then the **default-profile**, if configured, is applied. If the **default-profile** is also not configured, then the subscriber session is created with no charging applied.

**Options** ***roamer-profile***—Name of the roamer profile.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- **charging (APN) on page 739**
- **charging-profiles on page 824**
- **global-profile (Serving Gateway) on page 851**

## service-mode (Charging Profiles)

**Syntax** service-mode maintenance;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging charging-profiles *profile-name*],
[edit unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Place the respective charging profile under maintenance mode.

When you have to make the following changes to the existing charging profile configuration, you must put the charging profile in maintenance mode:

- Change the CDR profile, transport profile, or the trigger profile associated with this charging profile
- Change the profile ID configuration
- Delete the charging profile

In maintenance mode, no new subscribers are accepted for that charging profile. However, maintenance mode does not become active until no existing subscriber sessions are using that charging profile and all the corresponding CDRs have been flushed out. Unless the maintenance mode becomes active, you cannot modify the above-mentioned charging profile attributes or delete the charging profile. Use the following commands to help you with maintenance mode tasks:

- To verify that the charging profile has entered active maintenance mode, use one of the following commands, as applicable:
  - For the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW)—**show unified-edge ggsn-pgw charging service-mode gateway *gateway-name* charging-profile *profile-name***
  - For the Serving Gateway (S-GW)—**show unified-edge sgw charging service-mode gateway *gateway-name* charging-profile *profile-name***
- To verify that the subscriber count has reached zero, use one of the following commands, as applicable:
  - For the GGSN or P-GW—**show unified-edge ggsn-pgw subscribers charging charging-profile *profile-name* gateway *gateway-name***
  - For the S-GW—**show unified-edge sgw subscribers charging charging-profile *profile-name* gateway *gateway-name***
- To verify that all CDRs for the transport profile referred to by this charging profile have been flushed out, use one of the following commands, as applicable:

  - For the GGSN or P-GW—**show unified-edge ggsn-pgw charging transfer status transport-profile-name** ***profile-name***
  - For the S-GW—**show unified-edge sgw charging transfer status transport-profile-name** ***profile-name***

- To explicitly end any subscriber sessions, use one of the following commands, as applicable:
  - For the GGSN or P-GW—**clear unified-edge ggsn-pgw subscribers charging charging-profile** ***profile-name*** **gateway** ***gateway-name***
  - For the S-GW—**clear unified-edge sgw subscribers charging charging-profile** ***profile-name*** **gateway** ***gateway-name***
- To explicitly flush all the CDRs for the transport profile referred to by this charging profile, use the one of the following commands, as applicable:
  - For the GGSN or P-GW—**clear unified-edge ggsn-pgw charging cdr transport-profile-name** ***profile-name*** **gateway-name** ***name***
  - For the S-GW—**clear unified-edge sgw charging cdr transport-profile-name** ***profile-name*** **gateway-name** ***name***

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- charging-profiles on page 824
- Changing a Charging Profile on page 414
- Mobility Maintenance Mode Overview on page 406

## service-mode (Transport Profiles)

**Syntax** service-mode maintenance;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging transport-profiles *profile-name*],
[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Place the respective transport profile under maintenance mode.

To make the following changes to the existing transport profile configuration, you must put that transport profile in maintenance mode:

- Change the CDR encoding format to comply with a different 3GPP technical specification release (that is, changing the **cdr-release** configuration)
- Delete the transport profile

In maintenance mode, no new subscribers are accepted for that transport profile. However, the maintenance mode does not become active until no existing subscriber sessions are using that transport profile and all corresponding CDRs have been flushed out. Unless the maintenance mode becomes active, you cannot modify the above-mentioned transport profile attributes or delete the transport profile. Use the following commands to help you with the maintenance mode tasks:

- To verify that the transport profile has entered active maintenance mode, use one of the following commands, as applicable:
  - For the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW)—**show unified-edge ggsn-pgw charging service-mode gateway *gateway-name* transport-profile *profile-name***
  - For the Serving Gateway (S-GW)—**show unified-edge sgw charging service-mode gateway *gateway-name* transport-profile *profile-name***
- To verify that the subscriber count has reached zero, use one of the following commands, as applicable:
  - For the GGSN or P-GW—**show unified-edge ggsn-pgw subscribers charging transport-profile *profile-name* gateway *gateway-name***
  - For the S-GW—**show unified-edge sgw subscribers charging transport-profile *profile-name* gateway *gateway-name***
- To verify that all CDRs for the transport profile have been flushed out, use one of the following commands, as applicable:
  - For the GGSN or P-GW—**show unified-edge ggsn-pgw charging transfer status transport-profile-name *profile-name***

  - For the S-GW—**show unified-edge sgw charging transfer status transport-profile-name** ***profile-name***

- To explicitly end any subscriber sessions, use one of the following commands, as applicable:
  - For the GGSN or P-GW—**clear unified-edge ggsn-pgw subscribers charging transport-profile** ***profile-name*** **gateway** ***gateway-name***
  - For the S-GW—**clear unified-edge sgw subscribers charging transport-profile** ***profile-name*** **gateway** ***gateway-name***
- To explicitly flush all the CDRs for the transport profile, use one of the following commands, as applicable:
  - For the GGSN or P-GW—**clear unified-edge ggsn-pgw charging cdr transport-profile-name** ***profile-name***
  - For the S-GW—**clear unified-edge sgw charging cdr transport-profile-name** ***profile-name***

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- transport-profiles on page 888
- Changing a Transport Profile on page 416
- Mobility Maintenance Mode Overview on page 406

## sgsn-mme-change-limit (Serving Gateway)

**Syntax** sgsn-mme-change-limit *value*;

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name* offline]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the maximum number of serving GPRS support node (SGSN) or Mobility Management Entity (MME) changes that can occur before the Charging Data Record (CDR) is updated and closed.

**Options** *value*—Maximum number of SGSN or MME changes.
**Range:** 1 through 5.
**Default:** 4

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- offline on page 861
- Configuring Charging Trigger Events on page 304
- Configuring Charging on page 287

## sgsn-sgw-change-limit (GGSN or P-GW)

**Syntax** sgsn-sgw-change-limit *value*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging trigger-profiles *profile-name* offline]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the maximum number of Serving GPRS Support Node (SGSN) or Serving Gateway (S-GW) changes that can occur before the CDR is updated and closed.

**Options** ***value***—Maximum number of SGSN or S-GW changes.

**Range:** 1 through 5.

**Default:** 4

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- offline on page 861
- Configuring Charging Trigger Events on page 304
- Configuring Charging on page 287

## source-interface (GTP Prime)

**Syntax**

```
source-interface {
  interface-name;
  ipv4-address address;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp],
[edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp peer *peer-name*],
[edit unified-edge gateways sgw *gateway-name* charging gtpp],
[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging gtpp]** and **[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]** hierarchy levels introduced in Junos OS Mobility Release 11.4W.

**Description**

Configure the name of the local loopback interface and its IPv4 address as the source interface from which the GTP Prime packets are sent to the charging gateway function (CGF) servers. This is a mandatory configuration. However, before specifying this configuration, make sure that the interface has been previously defined.

The following is a sample configuration:

```
gtpp {
    source-interface {
        lo0.0;
        ipv4-address 10.10.10.10;
    }
}
```

When there are global-level and peer-level configurations, the peer-level configuration takes precedence.

**Options**

***address***—IPv4 address of the local loopback interface from which the GTP Prime packets are sent. This is a mandatory configuration.

***interface-name***—Name of the local loopback interface from which the GTP Prime packets are sent. This is a mandatory configuration.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- gtpp on page 852
- peer (GTP Prime) on page 862
- Configuring GTP Prime for Charging on page 297
- Configuring GTP Prime Peers on page 298
- Configuring Charging on page 287

## switch-back-time

**Syntax** switch-back-time *seconds*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways],
[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** The charging data function (CDF) transmits Charging Data Records (CDRs) to the highest-priority peer. The priority is determined by the **peer-order** configuration. If for any reason the highest-priority peer goes down, the CDF transmits the CDRs to the next high-priority peer and so on. If none of the peers are up, then the CDRs are transmitted to the local Routing Engine disk, if it is configured. During this transmission, it is possible that a peer or a peer that is higher in priority might come up. Instead of immediately switching over the transmission of the CDRs to the peer that recently came up, you can configure the duration that the CDF must wait to transmit the CDRs to the highest-priority peer that becomes available after this duration.

NOTE: If all the peers are down, in order not to lose any CDR data, you might want to configure the local storage on the Routing Engine disk using the following statement:

- **set unified-edge gateways ggsn-pgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways persistent-storage-order local-storage** for the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW).
- **set unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name* offline charging-gateways persistent-storage-order local-storage** for the Serving Gateway (S-GW).

However, even if the Routing Engine disk is not configured for storage, the CDR data is not lost because it gets buffered in the services PICs. Services PICs can buffer up to a maximum of 2 GB of data, after which a call admission control (CAC) is triggered.

In the meantime, if one or multiple peers come alive, then CDF waits for the configured **switch-back-time** duration and routes the CDRs to the highest-priority peer that is alive after this duration. The CDRs that were stored previously on the Routing Engine disk are not routed to the charging gateway (peer) and remain on the disk. You need to transfer the CDRs using SSH FTP (SFTP) from the following location on the disk: **/opt/mobility/charging/ggsn/final_log**.

**Options** ***seconds***—Time, in seconds, CDF waits before transmitting the CDRs to the highest-priority peer.

**Range:** 0 through 300 seconds

**Default:** 30 seconds

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- charging-gateways on page 823
- Configuring Transport Profiles on page 303
- Configuring Charging on page 287

## t3-response (GTP Prime)

**Syntax** t3-response *response-interval*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp],
[edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp peer *peer-name*],
[edit unified-edge gateways sgw *gateway-name* charging gtpp],
[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging gtpp]** and **[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]** hierarchy levels introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the duration (in seconds) that the charging data function (CDF) must wait before resending a GTP Prime message when the response to a request has not been received.

When there are global-level and peer-level configurations, the peer-level configuration takes precedence.

**Options** ***response-interval***—Time that the CDF waits before resending a GTP Prime message when the response to a request has not been received.

**Range:** 1 through 5 seconds

**Default:** 5 seconds

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- gtpp on page 852
- peer (GTP Prime) on page 862
- Configuring GTP Prime for Charging on page 297
- Configuring GTP Prime Peers on page 298
- Configuring Charging on page 287

## tariff-time-list

**Syntax**

```
tariff-time-list {
  [tariff-time];
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging trigger-profiles *profile-name*], [edit unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure a list of local times (in hh:mm format) at which the tariff changes and Charging Data Records (CDRs) are generated to reflect the change in tariff. Because you can configure multiple values, make sure that there is a difference of at least 15 minutes between these values. You can configure up to a maximum of 24 values.

Any change to the existing configuration applies to both existing and new subscriber sessions.

**Options** ***tariff-time***—Local time at which to generate a CDR, in hh:mm format, when the tariff changes.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- trigger-profiles on page 891
- Configuring Charging Trigger Events on page 304
- Configuring Charging on page 287

## time-limit

**Syntax** time-limit *value*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging trigger-profiles *profile-name* offline],
[edit unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name* offline]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name* offline]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the duration, in seconds, (since the previous trigger) after which the Charging Data Record (CDR) is updated with the uplink and downlink bytes transmitted in this duration and is closed. For example, if the duration is set to 3600 seconds, then the total resource utilization for the past hour is added to the CDR and the CDR is closed.

Any change to the existing configuration does not affect a previously established session. The updated configuration applies only to new sessions.

**Options** ***value***—Duration in seconds.

**Range:** 600 through 65,535 seconds

**Default:** 0, indicates that no time limit is set.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- offline on page 861
- Configuring Charging Trigger Events on page 304
- Configuring Charging on page 287

## traceoptions (Charging)

**Syntax**

```
traceoptions {
  file file-name <files number> <no-world-readable | world-readable> <size size>;
  flag flag;
  level (all | critical | error | info | notice | verbose | warning);
  no-remote-trace;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify tracing options for charging.

**Options**

**file *file-name***—Name of the file to receive the output of the tracing operation. The router appends **-ms*fpc#pic#*** to the filename and places the file in the **/var/log** directory. For example, if you configured the filename as **smd**, then the actual log filename on the router is **smd-ms50**, where ms stands for multiservices card, and 5 and 0 are the FPC and PIC slot numbers.

**Range:** 1 through 1024 bytes

**files *number***—(Optional) Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

**Range:** 2 through 1000 files

**Default:** 3 files

**flag *flag***—Specify which operations are to be traced. To specify more than one operation, include multiple flag statements.

CAUTION: You might want to enable traceoptions only when you want to debug specific charging operations. Enabling the traceoption flags might have an impact on the system performance.

- **all**—Trace all operations of all charging submodules.
- **cdr-encoding**—Trace ASN1 encoding of the CDRs.
- **client-fsm**—Trace the charging-specific finite state machine (FSM) in the application framework (mobile-smd).
- **config**—Trace configuration events on both daemons (chargemand and mobile-smd).
- **fsm**—Trace FSM.
- **general**—Trace general events that do not fit in any specific traces, such as errors in chargemand.

- **group-fsm**—Trace the transport-profile FSM in chargemand.
- **init**—Trace initialization events.
- **ipc**—Trace the interprocess communication (IPC) messages between mobile-smd and chargemand.
- **path-management**—Trace path management operations within the path manager module within chargemand.
- **request**—This flag is currently disabled.
- **resource**—Trace resources, such as memory, counters, and so on.
- **response**—This flag is currently disabled.
- **timers**—Trace resources associated with timer processing.
- **transport**—Trace transport-profile-level operations in chargemand.
- **triggers**—Trace trigger-profile-related operations used by the mobile-smd charging module.

**level**—Level of tracing to perform. You can specify any of the following levels:

- **all**—Match all levels.
- **critical**—Match error conditions.
- **error**—Match error conditions.
- **info**—Match informational messages.
- **notice**—Match conditions that must be handled specially.
- **verbose**—Match verbose messages.
- **warning**—Match warning messages.

**no-remote-trace**—(Optional) Disable remote tracing.

**no-world-readable**—(Optional) Disable unrestricted file access.

**size *size***—(Optional) Maximum size of each trace file, in kilobytes (KB) or megabytes (MB). When a trace file named trace-file reaches this size, it is renamed **trace-file.0**. When the trace-file again reaches its maximum size, **trace-file.0** is renamed **trace-file.1** and trace-file is renamed **trace-file.0**. This renaming scheme continues until the maximum number of trace files is reached. Then, the oldest trace file is overwritten. If you specify a maximum number of files, you must also specify a maximum file size with the size option.

**Syntax:** *xk* to specify KB, *xm* to specify MB, or *xg* to specify GB.

**Range:** 10,240 through 1,073,741,824 bytes

**Default:** 128 KB

**world-readable**—(Optional) Enable unrestricted file access.

**Required Privilege Level**

trace and unified-edge—To view this statement in the configuration.
trace-control and unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- charging on page 819
- Tracing Charging Operations on page 310

## traceoptions (Local Persistent Storage)

**Syntax**

```
traceoptions {
  file file-name <files number> <match regular-expression> <no-world-readable |
    world-readable> <size size>;
  flag flag;
  level (all | critical | error | info | notice | verbose | warning);
  no-remote-trace;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* charging local-persistent-storage-options],
[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

Specify tracing options related to the storage of Charging Data Records (CDRs) on the local Routing Engine disk.

**Options**

**file *filename***—Name of the file to receive the output of the tracing operation.

**Range:** 1 through 1024 bytes

**files *number***—(Optional) Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

**Range:** 2 through 1000 files

**Default:** 3 files

**flag *flag***—Specify which operations are to be traced. To specify more than one operation, include multiple flag statements.

CAUTION: You may want to enable traceoptions only when you want to debug specific charging operations. Enabling the traceoption flags might have an impact on the system performance.

- **all**—Trace all operations.
- **connection**—Trace the connection establishment between Routing Engine and all services PICs for CDR file backup.
- **file-operations**—Trace all file open, write, and close operations.
- **general**—Trace general operations.

- **journaling**—Trace journaling operations. Journaling creates a log for each file-write operation, which helps to sanitize the CDR data in temporary log files after a reboot.
- **mirror**—Trace mirroring operations. Mirroring enables you to synchronize the CDR file information onto backup.

**level**—Level of tracing to perform. You can specify any of the following levels:

- **all**—Match all levels.
- **critical**—Match critical conditions.
- **error**—Match error conditions.
- **info**—Match informational messages.
- **notice**—Match conditions that must be handled specially.
- **verbose**—Match verbose messages.
- **warning**—Match warning messages.

**match *regex***—(Optional) Refine the output to include lines that contain the regular expression (regex).

**no-remote-trace**—(Optional) Disable remote tracing.

**no-world-readable**—(Optional) Disable unrestricted file access.

**size *size***—(Optional) Maximum size of each trace file, in kilobytes (KB) or megabytes (MB). When a trace file named trace-file reaches this size, it is renamed **trace-file.0**. When the trace-file again reaches its maximum size, **trace-file.0** is renamed **trace-file.1** and trace-file is renamed **trace-file.0**. This renaming scheme continues until the maximum number of trace files is reached. Then, the oldest trace file is overwritten. If you specify a maximum number of files, you must also specify a maximum file size with the size option.

**Syntax:** *xk* to specify KB, *xm* to specify MB, or *xg* to specify GB.

**Range:** 10,240 through 1,073,741,824 bytes

**Default:** 128 KB

**world-readable**—(Optional) Enable unrestricted file access.

**Required Privilege Level**

trace and unified-edge—To view this statement in the configuration.
trace-control and unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- local-persistent-storage-options on page 855
- Configuring Persistent Storage on page 299

## transport-profile

**Syntax** transport-profile *profile-name*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging charging-profiles *profile-name*],
[edit unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Associate a transport profile with a charging profile. However, make sure this profile has been previously defined. This is a mandatory configuration.

When a subscriber session is created, the subscriber is bound to a charging profile and the transport profile configuration associated with this profile determines the transport of the CDRs generated for this subscriber from the charging data function (CDF) to the external charging gateway function (CGF) servers or the local Routing Engine disk, or both.

Any modification to the existing configuration of this attribute must be done only when the charging profile with which it is associated is under active maintenance mode. Use one of the following commands, as applicable, to bring the charging profile under maintenance mode:

- For the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW)—**set unified-edge gateways ggsn-pgw *gateway-name* charging charging-profiles *profile-name* service-mode maintenance**
- For the Serving Gateway (S-GW)—**set unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name* service-mode maintenance**

TIP: If the profile is not already defined, use one of the following commands, as applicable, to define a new transport profile:

- GGSN or P-GW—**set unified-edge gateways ggsn-pgw *gateway-name* charging transport-profiles *profile-name***
- S-GW—**set unified-edge gateways sgw *gateway-name* charging transport-profiles *profile-name***

**Options** ***profile-name***—Name of the transport profile to be associated with the charging profile.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- charging-profiles on page 824
- Configuring Charging Profiles on page 308
- Charging Profiles on page 285
- Configuring Charging on page 287

## transport-profiles

**Syntax**

```
transport-profiles profile-name {
  description string;
  offline {
    charging-gateways {
      cdr-aggregation-limit value;
      cdr-release (r7 | r8 | r99);
      mtu value;
      peer-order {
        [peer charging-gateway-peer-name];
      }
      persistent-storage-order {
        local-storage;
      }
      switch-back-time seconds;
    }
  }
  service-mode maintenance;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging],
[edit unified-edge gateways sgw *gateway-name* charging]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure a transport profile, which determines how the Charging Data Records (CDRs) are transported from the charging data function (CDF) to a storage resource, which can be external charging gateway function (CGF) servers or the local Routing Engine disk, or both. This is a mandatory configuration.

You can configure up to a maximum of eight transport profiles.

The remaining statements are explained separately.

**Options** ***profile-name***—Name of the transport profile.

**Range:** 1 through 128 bytes

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- charging on page 819
- Configuring Transport Profiles on page 303
- Configuring Charging on page 287

## transport-protocol (GTP Prime)

**Syntax** transport-protocol (tcp | udp);

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp],
[edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp peer *peer-name*],
[edit unified-edge gateways sgw *gateway-name* charging gtpp],
[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging gtpp]** and **[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]** hierarchy levels introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the transport protocol for transmitting the GTP Prime packets from the charging data function (CDF) to the charging gateway function (CGF) server, which can be either GTP Prime over UDP or GTP Prime over TCP.

When there are global-level and peer-level configurations, the peer-level configuration takes precedence.

**Options** **tcp**—Transport protocol used is TCP.

**udp**—Transport protocol used is UDP.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- gtpp on page 852
- peer (GTP Prime) on page 862
- Configuring GTP Prime for Charging on page 297
- Configuring GTP Prime Peers on page 298
- Configuring Charging on page 287

## trigger-profile

**Syntax** trigger-profile *profile-name*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging charging-profiles *profile-name*],
[edit unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging charging-profiles *profile-name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Associate a trigger profile with a charging profile. However, make sure this profile has been previously defined.

When a subscriber session is created, the subscriber is bound to a charging profile and the trigger profile configuration associated with this profile determines the events that result in the creation of a CDR, the addition of a container to a CDR, and the closure of a CDR.

TIP: If the profile is not already defined, use one of the following commands, as applicable, to define a new trigger profile:

- For the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW)—**set unified-edge gateways ggsn-pgw *gateway-name* charging trigger-profiles *profile-name***
- For the Serving Gateway (S-GW)—**set unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name***

**Options** ***profile-name***—Name of the trigger profile to be associated with the charging profile.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- charging-profiles on page 824
- Configuring Charging Profiles on page 308
- Charging Profiles on page 285
- Configuring Charging on page 287

## trigger-profiles

**Syntax**

```
trigger-profiles profile-name {
  description string;
  offline {
    container-limit value;
    exclude {
      ms-timezone-change;
      plmn-change;
      qos-change;
      rat-change;
      sgsn-mme-change; #S-GW only
      sgsn-sgw-change; #P-GW only
      user-location-change;
    }
    sgsn-mme-change-limit value; #S-GW only
    sgsn-sgw-change-limit value; #P-GW only
    time-limit value;
    volume-limit {
      value;
      direction (both | uplink);
    }
  }
  tariff-time-list {
    tariff-time;
  }
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging],
[edit unified-edge gateways sgw *gateway-name* charging]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure a trigger profile, which determines the events that trigger the creation of a Charging Data Record (CDR), addition of a container to a CDR, and the closure of a CDR.

You can configure up to a maximum of 16 trigger profiles.

NOTE: The CDR profile determines the content of a CDR, whereas the transport profile determines how the generated CDRs are transmitted to the charging gateway function (CGF) server.

The remaining statements are explained separately.

**Options** *profile-name*—Name of the trigger profile.

**Values:** 1 through 128 bytes

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- charging on page 819
- Configuring Charging Trigger Events on page 304
- Configuring Charging on page 287

## user-name (Local Persistent Storage)

**Syntax**
user-name *string*;

**Hierarchy Level**
[edit unified-edge gateways ggsn-pgw *gateway-name* charging
local-persistent-storage-options],
[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]

**Release Information**
Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**
Restrict access to the Charging Data Record (CDR) files to a specific user.

In addition to the non-root user who is authorized using this statement, the root user always has access permissions.

**Options**
***string***—Username.
**Values:** 1 through 32 bytes

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- local-persistent-storage-options on page 855
- Configuring Persistent Storage on page 299
- Configuring Charging on page 287

## version (GTP Prime)

**Syntax** version (v0 | v1 | v2);

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp],
[edit unified-edge gateways ggsn-pgw *gateway-name* charging gtpp peer *peer-name*],
[edit unified-edge gateways sgw *gateway-name* charging gtpp],
[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging gtpp]** and **[edit unified-edge gateways sgw *gateway-name* charging gtpp peer *peer-name*]** hierarchy levels introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the latest GTP Prime version that is supported on the configured local loopback source interface's IP address from which the GTP Prime packets are sent to the charging gateway function (CGF) server. The possible values are: **v0**, **v1**, or **v2**.

When there are global-level and peer-level configurations, the peer-level configuration takes precedence.

**Options** **v0**—GTP Prime version supported is v0.

**v1**—GTP Prime version supported is v1.

**v2**—GTP Prime version supported is v2.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- gtpp on page 852
- peer (GTP Prime) on page 862
- Configuring GTP Prime for Charging on page 297
- Configuring GTP Prime Peers on page 298
- Configuring Charging on page 287

## visitor-profile

**Syntax** visitor-profile *visitor-profile*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* apn-services apns *name* charging], [edit unified-edge gateways sgw *gateway-name* charging global-profile]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging global-profile]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the profile that should be used to charge visiting subscribers. If the **profile-selection-order** configuration indicates **static**, then this profile is used for visiting subscribers.

NOTE: **The charging profile must already be configured on the broadband gateway.**

The broadband gateway determines whether the subscriber is a visitor by using the mobile country code (MCC) and the mobile network code (MNC) values in the Create Session Request message from the subscriber's user equipment (UE). If the subscriber's International Mobile Subscriber Identity (IMSI), MCC, and MNC do not belong to the PLMN to which both the GGSN or P-GW and the S-GW belong, then the subscriber is deemed a visitor and the **visitor-profile** is applied. If the **visitor-profile** is not configured, then the **default-profile**, if configured, is applied. If the **default-profile** is also not configured, then the subscriber session is created with no charging applied.

**Options** ***visitor-profile***—Name of the visitor profile.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Charging and Local Policy Profiles on a Broadband Gateway APN on page 125
- Configuring S-GW Global Charging Profiles and Selection Order on page 290
- **charging (APN) on page 739**
- **charging-profiles on page 824**
- **global-profile (Serving Gateway) on page 851**

## volume-limit

**Syntax**

```
volume-limit {
  value;
  direction (both | uplink);
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* charging trigger-profiles *profile-name* offline],
[edit unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name* offline]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging trigger-profiles *profile-name* offline]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

Configure the volume of data, in bytes, that is transmitted (since the previous trigger) before the Charging Data Record (CDR) is updated with the transmitted bytes and is closed. In addition, you can specify whether the maximum volume of data transmitted includes the data transmitted in both the uplink and downlink directions, or only in the uplink direction.

Any change to the existing configuration does not affect a previously established session. The updated configuration applies only to new sessions.

**Default**

If you do not include the **volume-limit** statement, the volume limit trigger is disabled.

**Options**

***value***—Maximum volume of data transmitted, in bytes, after which the CDR is updated and closed.

**Range:** 1 through 4 GB

The remaining statement is explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- offline on page 861
- Configuring Charging Trigger Events on page 304
- Configuring Charging on page 287

## watermark-level-1

**Syntax**

```
watermark-level-1 {
  notification-level (both | snmp-alarm | syslog);
  percentage value;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* charging local-persistent-storage-options disk-space-policy],
[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options disk-space-policy]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options disk-space-policy]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

Configure the percentage of Routing Engine disk space to be used for storage and the action to be taken when this limit is reached, such as raise SNMP alarms, record the alert information in the system logs, or both. You can then take appropriate measures to prevent any loss of Charging Data Record (CDR) data.

**Options**

**notification-level (both | snmp-alarm | syslog)**—Specify whether you want to raise SNMP alarms, log information on the system logs, or both, when the watermark level is reached.

- **both**—Log the alert information on system log files and also raise an SNMP alarm.
- **snmp-alarm**—Raise an SNMP alarm.
- **syslog**—Log the alert information on system log files.

**Default:** syslog

**percentage *value***—Percentage of Routing Engine disk space to be used for storage after which you get an alert (if it is configured). Entering 0 disables the checking for the watermark level.

**Default:** 70 percent of the Routing Engine disk space

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- disk-space-policy on page 834
- Configuring Persistent Storage on page 299
- Configuring Charging on page 287

## watermark-level-2

**Syntax**

```
watermark-level-2 {
  notification-level (both | snmp-alarm | syslog);
  percentage value;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* charging local-persistent-storage-options disk-space-policy],
[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options disk-space-policy]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options disk-space-policy]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

Configure the percentage of Routing Engine disk space to be used for storage and also the action to be taken when this limit is reached, such as raise SNMP alarms, record the alert information in the system logs, or both. You can then take appropriate measures to prevent any loss of Charging Data Record (CDR) data.

**Options**

**notification-level (both | snmp-alarm | syslog)**—Specify whether you want to raise SNMP alarms, log information on the system logs, or both when the watermark level is reached.

- **both**—Log the alert information on system log files and raise an SNMP alarm.
- **snmp-alarm**—Raise an SNMP alarm.
- **syslog**—Log the alert information on system log files.

**Default:** syslog

**percentage *value***—Percentage of Routing Engine disk space to be used for storage after which you get an alert (if it is configured). Entering 0 disables the checking for the watermark level.

**Default:** 80 percent of the Routing Engine disk space

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- disk-space-policy on page 834
- Configuring Persistent Storage on page 299
- Configuring Charging on page 287

## watermark-level-3

**Syntax**

```
watermark-level-3 {
  notification-level (both | snmp-alarm | syslog);
  percentage value;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name* charging local-persistent-storage-options disk-space-policy],
[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options disk-space-policy]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options disk-space-policy]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

Configure the percentage of Routing Engine disk space to be used for storage and also the action to be taken when this limit is reached, such as raise SNMP alarms, record the alert information in the system logs, or both.

When this watermark level is reached, the charging daemon stops writing the Charging Data Records (CDRs) to the local Routing Engine disk till the CDR storage space is restored by transferring the files using SSH FTP (SFTP) and deleting the files from the CDR log directory. However, the data is not immediately lost because the services PICs buffer up to 2 GB of data.

**Options**

**notification-level (both | snmp-alarm | syslog)**—Specify whether you want to raise SNMP alarms, log information on the system logs, or both when the watermark level is reached.

- **both**—Log the alert information on system log files and also raise an SNMP alarm.
- **snmp-alarm**—Raise an SNMP alarm.
- **syslog**—Log the alert information on system log files.

**Default:** syslog

**percentage *value***—Percentage of Routing Engine disk space to be used for storage after which you get an alert (if it is configured). Entering 0 disables the checking for the watermark level.

**Default:** 90 percent of the Routing Engine disk space

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- disk-space-policy on page 834
- Configuring Persistent Storage on page 299
- Configuring Charging on page 287

## world-readable (Local Persistent Storage)

**Syntax** world-readable;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* charging
local-persistent-storage-options],
[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* charging local-persistent-storage-options]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Allow all users to have read permissions on the Charging Data Record (CDR) files. By default, this is disabled.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- local-persistent-storage-options on page 855
- Configuring Persistent Storage on page 299
- Configuring Charging on page 287

CHAPTER 23

# Class of Service (CoS) Configuration Statements

## aggregated-qos-control (CoS Policy Profiles)

**Syntax**

```
aggregated-qos-control {
  maximum-bit-rate-downlink {
    mbr-downlink;
    reject;
    upgrade;
  }
  maximum-bit-rate-uplink {
    mbr-uplink;
    reject;
    upgrade;
  }
}
```

**Hierarchy Level** [edit unified-edge cos-cac cos-policy-profiles *name*]

**Description** Configure the aggregate maximum bit rate (AMBR) for uplink and downlink traffic.

The AMBR specifies the total maximum bit rate for all non-GBR bearers (4G) associated with an IP Connectivity Access Network (IP-CAN) session. A bearer request that specifies a higher AMBR than the configured value is downgraded by default.

The remaining statements are explained separately.

**Default** If you do not configure this statement, then the requested AMBR is accepted by the gateway.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Call Admission Control Overview on page 324
- Class of Service (CoS) Policy Profile Overview on page 327
- cos-policy-profiles on page 915

## allocation-retention-priority (CoS Policy Profiles)

**Syntax**

```
allocation-retention-priority {
  priority-value;
  reject;
}
```

**Hierarchy Level** [edit unified-edge cos-cac cos-policy-profiles *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W. **reject** statement added in Junos OS Mobility Release 11.4W.

**Description** Configure the allocation and retention priority (ARP) for the class of service (CoS) policy profile. This configuration is primarily used to determine whether the establishment or modification of PDP contexts (3G) or bearers (4G) are accepted or rejected.

Create PDP Context requests and Create Session requests with priority value numerically greater than the configured priority value are accepted, and requests with numerically lower value are downgraded to the configured value.

**Default** If this statement is not included, then the broadband gateway uses the ARP value sent in the Create PDP Context Request or Create Session Request message.

**Options** ***priority-value***—Specify the priority level for the PDP context or bearer.

**Range:** 1 through 15

**reject**—Specify that PDP contexts or bearers with priority level numerically lower than configured value are rejected.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Call Admission Control Overview on page 324
- Class of Service (CoS) Policy Profile Overview on page 327
- Configuring QoS on the Broadband Gateway Overview on page 333
- **cos-policy-profiles on page 915**
- Quality of Service Overview on page 318

## anchor-pfe-default-bearers-percentage (Serving Gateway)

**Syntax** anchor-pfe-default-bearers-percentage *default-bearers-percentage*;

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the maximum number of Evolved Packet System (EPS) default bearers allowed for each anchor Packet Forwarding Engine on the Serving Gateway (S-GW). This value is specified as a percentage of the maximum number of EPS default bearers allowed for an anchor Packet Forwarding Engine.

**Options**

***default-bearers-percentage***—Maximum number of EPS default bearers per anchor Packet Forwarding Engine, specified as a percentage of the maximum number of EPS default bearers or allowed.

**Range:** 10 through 100 percent

**Default:** 100 percent, which indicates that there is no restriction on the maximum number of EPS default bearers admitted on an anchor Packet Forwarding Engine. The only limitation is that the total number of bearers admitted on the anchor Packet Forwarding Engine cannot exceed the maximum number of bearers allowed for an anchor Packet Forwarding Engine.

**Required Privilege Level**

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- anchor-pfe-guaranteed-bandwidth (Serving Gateway) on page 904
- anchor-pfe-maximum-bearers (Serving Gateway) on page 905
- Configuring S-GW-Specific CAC Parameters on page 396

## anchor-pfe-guaranteed-bandwidth (Serving Gateway)

**Syntax** anchor-pfe-guaranteed-bandwidth *anchor-pfe-guaranteed-bandwidth*;

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the guaranteed bandwidth for each anchor Packet Forwarding Engine on the Serving Gateway (S-GW). This value limits the bandwidth available to guaranteed bit rate (GBR) bearers on an anchor Packet Forwarding Engine, which in turn limits the number of GBR bearers that can be created on an anchor Packet Forwarding Engine.

NOTE: Configuring a value that is more than the actual physical bandwidth of the anchor Packet Forwarding Engine results in oversubscription; in this scenario only a best-effort service can be provided.

**Options** ***anchor-pfe-guaranteed-bandwidth*** —Guaranteed bandwidth per anchor Packet Forwarding Engine.

**Range:** 10 through 100 gigabits per second (Gbps)

**Default:** 40 Gbps

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- anchor-pfe-default-bearers-percentage (Serving Gateway) on page 903
- anchor-pfe-maximum-bearers (Serving Gateway) on page 905
- Configuring S-GW-Specific CAC Parameters on page 396

## anchor-pfe-maximum-bearers (Serving Gateway)

**Syntax** anchor-pfe-maximum-bearers *maximum-bearers*;

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the maximum number of Evolved Packet System (EPS) bearers, both default and dedicated, allowed for each anchor Packet Forwarding Engine on the Serving Gateway (S-GW).

**Options** ***maximum-bearers***—Maximum number of EPS bearers, in multiples of one thousand, per anchor Packet Forwarding Engine.

**Range:** 100 through 510,000 bearers

**Default:** 510,000 bearers

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- anchor-pfe-default-bearers-percentage (Serving Gateway) on page 903
- anchor-pfe-guaranteed-bandwidth (Serving Gateway) on page 904
- Configuring S-GW-Specific CAC Parameters on page 396

## bearers-load (Resource Threshold Profiles)

**Syntax**

```
bearers-load {
  high {
    percentage percentage;
    priority-level priority-level;
  }
  low {
    percentage percentage;
    priority-level priority-level;
  }
}
```

**Hierarchy Level** [edit unified-edge cos-cac resource-threshold-profiles *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the lower and upper limits for the bearer load in the resource threshold profile. The bearer load specifies a precise level of admission control when the bearer load reaches a configured lower or upper threshold.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Call Admission Control Overview on page 324
- Configuring Resource Thresholds for 3G and 4G Networks on page 337
- resource-threshold-profiles (QoS) on page 962

## classifier-profile (Local Policies)

**Syntax** classifier-profile *profile-name*;

**Hierarchy Level** [edit unified-edge local-policies *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the classifier profile for home subscribers. A classifier profile defines the packet forwarding treatment for each bearer depending on its QoS Class Identifiers (QCIs).

**Options** ***profile-name***—Name of the classifier profile.

NOTE: The classifier policy profile must be previously configured on the broadband gateway at the [edit unified-edge cos-cac classifier-profiles] hierarchy level.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring a Local Policy on page 354
- Configuring QoS on the Broadband Gateway Overview on page 333
- classifier-profiles on page 908
- local-policies (QoS) on page 939

## classifier-profiles

**Syntax**

```
classifier-profiles {
  name {
    description description;
    qos-class-identifier qci-value {
      forwarding-class class-name;
      loss-priority (high | low);
    }
  }
}
```

**Hierarchy Level** [edit unified-edge cos-cac]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure a QoS classifier profile, which defines the packet forwarding treatment for each bearer (for the broadband gateway) depending on its QoS Class Identifiers (QCIs). The QCI is associated with priority, delay, and packet loss values.

**Default** If you do not configure the classifier profile, then no classification is done based on the mobile CoS parameters.

**Options** *name*—Name of the classifier profile.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring a Classifier Profile for 3G and 4G Networks on page 338
- Configuring QoS on the Broadband Gateway Overview on page 333
- cos-cac on page 911
- Quality of Service Overview on page 318

## class-of-service (MobileNext Broadband Gateway)

**Syntax**

```
class-of-service {
  interfaces {
    mif. number {
      unit logical-unit-number {
        ingress-rewrite-rules {
          [dscp (rewrite-rule-name | default)];
          [dscp-ipv6 (rewrite-rule-name | default)];
          [inet-precedence (rewrite-rule-name | default)];
          }
        }
        rewrite-rules {
          [dscp (rewrite-rule-name | default)] {
            protocol [(gtp-inet-both | gtp-inet-outer)];
          }
          [dscp-ipv6 (rewrite-rule-name | default)] {
            protocol [(mpls | gtp-inet-both | gtp-inet-outer)];
          }
          [inet-precedence (rewrite-rule-name | default)] {
            protocol [(gtp-inet-both | gtp-inet-outer)];
          }
        }
      }
    }
  }
}
```

**Hierarchy Level** [edit]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the class of service (CoS) for the 3GPP support for the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW). At the first instance, you must configure the ingress and egress rewrite rules to set the value of the CoS bits within the IP header of upstream and downstream subscriber packets received on the mobile interface. Later, you must apply the ingress and egress rewrite rules to the mobile interface to set CoS values for upstream and downstream packets. Within ingress and egress, you can specify rewrite rules for DSCP v4, DSCP v6, or IP precedence values.

NOTE: For the S-GW, the configuration at the mobile interface level does not apply. Instead, class of service is configured on Junos OS interfaces.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- [edit class-of-service] Hierarchy Level on page 595
- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- Applying Ingress Rewrite Rules to a Mobile Interface on page 357
- Configuring QoS on the Broadband Gateway Overview on page 333

## cos-cac

**Syntax**

```
cos-cac {
  classifier-profiles {
    name {
      description description;
      qos-class-identifier qci-value {
        forwarding-class class-name;
        loss-priority (high | low);
      }
    }
  }
  cos-policy-profiles {
    name {
      aggregated-qos-control {
        maximum-bit-rate-downlink {
          mbr-downlink;
          reject;
          upgrade;
        }
        maximum-bit-rate-uplink {
          mbr-uplink;
          reject;
          upgrade;
        }
      }
      allocation-retention-priority {
        priority-value;
        reject;
      }
      default-bearer-qci {
        qci-value;
        reject;
        upgrade;
      }
      description description;
      pdp-qos-control {
        guaranteed-bit-rate-downlink {
          gbr-downlink;
          reject;
          upgrade;
        }
        guaranteed-bit-rate-uplink {
          gbr-uplink;
          reject;
          upgrade;
        }
        maximum-bit-rate-downlink {
          mbr-downlink;
          reject;
          upgrade;
        }
        maximum-bit-rate-uplink {
          mbr-uplink;
```

```
            reject;
            upgrade;
          }
          qci qci-value {
            maximum-bit-rate-downlink {
              mbr-downlink;
              reject;
              upgrade;
            }
            maximum-bit-rate-uplink {
              mbr-uplink;
              reject;
              upgrade;
            }
          }
        }
        policer-action {
          gbr-bearer {
            exceed-action (drop | transmit);
            violate-action (set-loss-priority-high | transmit);
          }
          non-gbr-bearer {
            violate-action (set-loss-priority-high | transmit);
          }
        }
      }
    }
    gbr-bandwidth-pools {
      name {
        downgrade-gtp-v1-gbr-bearers;
        maximum-bandwidth maximum-bandwidth;
      }
    }
    resource-threshold-profiles {
      name {
        bearers-load {
          high {
            percentage percentage;
            priority-level priority-level;
          }
          low {
            percentage percentage;
            priority-level priority-level;
          }
        }
        cpu {
          high {
            percentage percentage;
            priority-level priority-level;
          }
          low {
            percentage percentage;
            priority-level priority-level;
          }
        }
        description description;
```

```
        memory {
          high {
            percentage percentage;
            priority-level priority-level;
          }
          low {
            percentage percentage;
            priority-level priority-level;
          }
        }
      }
    }
  }
```

**Hierarchy Level** [edit unified-edge]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the set of parameters for the class of service (CoS) call admission control (CAC).

Call admission control on the broadband gateway ensures that the required network resources are available for real-time data traffic such as voice and video. Call admission control maintains information about all resources available on the broadband gateway and resources that have been allocated to bearers.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- [edit unified-edge cos-cac] Hierarchy Level on page 602
- Configuring QoS on the Broadband Gateway Overview on page 333
- Call Admission Control Overview on page 324
- Class of Service (CoS) Policy Profile Overview on page 327
- Policing Subscriber Traffic on the Broadband Gateway Overview on page 328
- Quality of Service Overview on page 318

## cos-policy-profile (Local Policies)

**Syntax** cos-policy-profile *profile-name*;

**Hierarchy Level** [edit unified-edge local-policies *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the class-of-service (CoS) policy profile for home subscribers. You configure a CoS policy profile to define policies for limiting, upgrading, or rejecting calls based on the requested QoS parameters.

**Options** ***profile-name***—Name of the CoS policy profile name.

NOTE: The CoS policy profile must be previously configured on the broadband gateway at the [edit unified-edge cos-cac cos-policy-profiles] hierarchy level.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring a Local Policy on page 354
- Configuring QoS on the Broadband Gateway Overview on page 333
- cos-policy-profiles on page 915
- local-policies (QoS) on page 939

## cos-policy-profiles

**Syntax**

```
cos-policy-profiles {
  name {
    aggregated-qos-control {
      maximum-bit-rate-downlink {
        mbr-downlink;
        reject;
        upgrade;
      }
      maximum-bit-rate-uplink {
        mbr-uplink;
        reject;
        upgrade;
      }
    }
    allocation-retention-priority {
      priority-value;
      reject;
    }
    default-bearer-qci {
      qci-value;
      reject;
      upgrade;
    }
    description description;
    pdp-qos-control {
      guaranteed-bit-rate-downlink {
        gbr-downlink;
        reject;
        upgrade;
      }
      guaranteed-bit-rate-uplink {
        gbr-uplink;
        reject;
        upgrade;
      }
      maximum-bit-rate-downlink {
        mbr-downlink;
        reject;
        upgrade;
      }
      maximum-bit-rate-uplink {
        mbr-uplink;
        reject;
        upgrade;
      }
      qci qci-value {
        maximum-bit-rate-downlink {
          mbr-downlink;
          reject;
          upgrade;
        }
        maximum-bit-rate-uplink {
```

```
            mbr-uplink;
            reject;
            upgrade;
          }
        }
      }
      policer-action {
        gbr-bearer {
          exceed-action (drop | transmit);
          violate-action (set-loss-priority-high | transmit);
        }
        non-gbr-bearer {
          violate-action (set-loss-priority-high | transmit);
        }
      }
    }
  }
```

**Hierarchy Level** [edit unified-edge cos-cac]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Define the policies for limiting, upgrading, or rejecting calls based on the requested QoS parameters. For a 3G network, the CoS policy profile defines the highest traffic class that can be accepted at an APN or gateway level, the maximum bit rate and guaranteed bit rate for bearers, and the allocation and retention priority. For a 4G network, the CoS policy profile defines the highest QoS Class Identifier (QCI) value that can be accepted at the APN level or gateway level, the aggregated maximum bit rate (AMBR) for default bearers, and the priority level.

**Options** *name*—Name of the CoS policy profile.

**Range:** Up to 64 characters

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- [edit unified-edge cos-cac] Hierarchy Level on page 602
- Call Admission Control Overview on page 324
- Class of Service (CoS) Policy Profile Overview on page 327
- Quality of Service Overview on page 318
- Configuring QoS on the Broadband Gateway Overview on page 333

## cpu (Resource Threshold Profiles)

**Syntax**

```
cpu {
  high {
    percentage percentage;
    priority-level priority-level;
  }
  low {
    percentage percentage;
    priority-level priority-level;
  }
}
```

**Hierarchy Level** [edit unified-edge cos-cac resource-threshold-profiles *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the lower and upper limits for the CPU load (at the session PIC level) in the resource threshold profile. The CPU load specifies a precise level of admission control when the CPU load for a session PIC reaches a configured lower or upper threshold.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Call Admission Control Overview on page 324
- Configuring Resource Thresholds for 3G and 4G Networks on page 337
- resource-threshold-profiles (QoS) on page 962

## default-bearer-qci (CoS Policy Profiles)

**Syntax**

```
default-bearer-qci {
  qci-value;
  reject;
  upgrade;
}
```

**Hierarchy Level** [edit unified-edge cos-cac cos-policy-profiles *name*]

**Description** Configure the QoS Class Identifier (QCI) for default bearers. Table 60 on page 918 explains the different configuration scenarios for this statement.

### Table 60: default-bearer-qci Configuration Scenarios

| Scenario | Behavior |
|---|---|
| Only ***qci-value*** configured | Create PDP Context Requests and Create Session Requests with QCI values numerically greater than or equal to the configured QCI value are accepted, and requests numerically lower than the configured QCI are downgraded to the configured QCI. |
| ***qci-value*** and **reject** configured | Create PDP Context Requests and Create Session Requests with QCI values numerically greater than or equal to the configured QCI value are accepted, and requests numerically lower than the configured QCI are rejected. |
| ***qci-value*** and **upgrade** configured | Create PDP Context Requests and Create Session Requests with QCI values numerically greater than the configured QCI value are upgraded to the configured QCI, and requests numerically lower than configured QCI are downgraded to the configured QCI. |
| ***qci-value***, **reject** and **upgrade** configured | Create PDP Context Requests and Create Session Requests with QCI values numerically greater than the configured QCI value are upgraded to the configured QCI, and requests numerically lower than configured QCI are rejected. |

**Default** If this statement is not included, then the broadband gateway accepts the QCI value in the Create PDP Context Request or Create Session Request message.

**Options** ***qci-value***—Specify the QCI value for the default bearer.

NOTE: If you configure the **default-bearer-qci** statement, then you must specify the QCI value.

**Range:** 5 through 9

**reject**—Specify that default bearers with QCI value numerically lower than the specified QCI are rejected.

**upgrade**—Specify that the configured QCI value is enforced for the default bearers.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Call Admission Control Overview on page 324
- Class of Service (CoS) Policy Profile Overview on page 327
- Configuring QoS on the Broadband Gateway Overview on page 333
- cos-policy-profiles on page 915
- Quality of Service Overview on page 318

## description (Class of Service)

**Syntax**
description *description*;

**Hierarchy Level**
[edit unified-edge cos-cac classifier-profiles *name*],
[edit unified-edge cos-cac cos-policy-profiles *name*],
[edit unified-edge cos-cac resource-threshold-profiles *name*],
[edit unified-edge local-policies *name*],

**Description**
Enter a description for the classifier profile, QoS policy profile, resource threshold profile, or the local policy.

**Options**
***description***—Description.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- classifier-profiles on page 908
- cos-policy-profiles on page 915
- local-policies (QoS) on page 939
- resource-threshold-profiles (QoS) on page 962

## dl-bandwidth-pool (Local Policies)

**Syntax** dl-bandwidth-pool *pool-name*;

**Hierarchy Level** [edit unified-edge local-policies *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the bandwidth pool for limiting the downlink bandwidth usage at the gateway or at the APN level.

**Options** ***pool-name***—Name of the downlink bandwidth pool.

NOTE: The bandwidth pool must be previously configured on the broadband gateway at the [edit unified-edge cos-cac gbr-bandwidth-pools] hierarchy level.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring a Local Policy on page 354
- Configuring QoS on the Broadband Gateway Overview on page 333
- gbr-bandwidth-pools (Class of Service) on page 928
- local-policies (QoS) on page 939

## downgrade-gtp-v1-gbr-bearers (Guaranteed Bit Rate Bandwidth Pools)

**Syntax** downgrade-gtp-v1-gbr-bearers;

**Hierarchy Level** [edit unified-edge cos-cac bandwidth-pools *name* gbr-bandwidth-pools *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify that the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW) should downgrade the traffic class of GTPv1 guaranteed bit rate (GBR) bearers to background traffic class. When the bandwidth requested by the bearers is greater than available maximum bandwidth in the pool, then the gateway downgrades the traffic class of GTPv1 GBR bearers.

**Default** If you do not include this statement, then Create or Modify Bearer Requests are rejected when the bandwidth requested by the bearers is greater than the available maximum bandwidth in the pool.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Call Admission Control Overview on page 324
- Configuring Bandwidth Pools on page 335
- Configuring QoS on the Broadband Gateway Overview on page 333
- **gbr-bandwidth-pools (Class of Service) on page 928**

## dscp-ipv6 (Egress Rewrite Rules)

**Syntax**

```
[dscp-ipv6 (rewrite-rule-name | default)] {
  protocol [(mpls | gtp-inet-both | gtp-inet-outer)];
}
```

**Hierarchy Level** [edit class-of-service interfaces mif unit *interface-unit-number* rewrite-rules]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the DiffServ code point (DSCP) IPv6 egress rewrite rule for the mobile interface. The rewrite rule changes the DSCP IPv6 value in the IP header of downstream (Gi to Gn or SGi to S5 traffic) subscriber packets. The rewrite rule can be applied to the inner IP header, the outer IP header, or both inner and outer IP header.

**Options** ***rewrite-rule-name***—Name of the rewrite rule.

NOTE: The rewrite rule must be previously defined at the [edit class-of-service rewrite-rules dscp-ipv6] hierarchy level.

**default**—Apply the default rewrite rule.

The remaining statement is explained separately

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Applying Egress Rewrite Rules to Mobile Interfaces on page 358
- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- **rewrite-rules (Egress) on page 964**

## dscp-ipv6 (Ingress Rewrite Rules)

**Syntax** [dscp-ipv6 (*rewrite-rule-name* | default)];

**Hierarchy Level** [edit class-of-service interfaces mif unit *interface-unit-number* ingress-rewrite-rules]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the DiffServ code point (DSCP) IPv6 ingress rewrite rule for the mobile interface. The rewrite rule changes the DSCP IPv6 value only in the outer IP header of upstream (Gn to Gi or S5 to SGi traffic) subscriber packets.

**Options** ***rewrite-rule-name***——Name of the rewrite rule.

NOTE: The rewrite rule must be previously defined at the [edit class-of-service rewrite-rules dscp-ipv6] hierarchy level.

**default**—Apply the default rewrite rule.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Applying Ingress Rewrite Rules to a Mobile Interface on page 357
- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- ingress-rewrite-rules on page 937

## dscp (Egress Rewrite Rules)

**Syntax**

```
[dscp (rewrite-rule-name | default)] {
  protocol [(gtp-inet-both | gtp-inet-outer)];
}
```

**Hierarchy Level** [edit class-of-service interfaces mif unit *interface-unit-number* rewrite-rules]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the DiffServ code point (DSCP) egress rewrite rule for the mobile interface. The rewrite rule changes the DSCP value in the IP header of downstream (Gi to Gn or SGi to S5 traffic) subscriber packets. The rewrite rule can be applied to the inner IP header, the outer IP header, or both the inner and outer IP headers.

**Options** ***rewrite-rule-name***—Name of the rewrite rule.

NOTE: The rewrite rule must be previously defined at the [edit class-of-service rewrite-rules dscp] hierarchy level.

**default**—Apply the default rewrite rule.

The remaining statement is explained separately

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Applying Egress Rewrite Rules to Mobile Interfaces on page 358
- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- **rewrite-rules (Egress) on page 964**

## dscp (Ingress Rewrite Rules)

**Syntax** [dscp (*rewrite-rule-name* | default)];

**Hierarchy Level** [edit class-of-service interfaces mif unit *interface-unit-number* ingress-rewrite-rules]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the DiffServ code point (DSCP) ingress rewrite rule for the mobile interface. The rewrite rule changes the DSCP value only in the outer IP header of upstream (Gn to Gi or S5 to SGi traffic) subscriber packets.

**Options** ***rewrite-rule-name***—Name of the rewrite rule.

NOTE: The rewrite rule must be previously defined at the [edit class-of-service rewrite-rules dscp] hierarchy level.

**default**—Apply the default rewrite rule.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Applying Ingress Rewrite Rules to a Mobile Interface on page 357
- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- ingress-rewrite-rules on page 937

## exceed-action (QoS Policer Action)

**Syntax** exceed-action (drop | transmit);

**Hierarchy Level** [edit unified-edge cos-cac cos-policy-profiles *name* policer-action gbr-bearer]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the policer action that is applied when the subscriber traffic exceeds the configured guaranteed bit rate (GBR) for GBR PDP contexts. The policer action controls packet behavior by setting the packet loss priority (PLP) to high, transmitting the packet without changing the PLP, or by dropping the packet.

**Default** If you do not include this statement, then the default action is to set the PLP to high.

**Options** **drop**—Drop the packet.

**transmit**—Transmit the packet without changing the PLP.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Policing Subscriber Traffic on the Broadband Gateway Overview on page 328
- gbr-bearer (QoS Policer Action) on page 929

## forwarding-class (QoS Class Identifier)

**Syntax** forwarding-class *class-name*;

**Hierarchy Level** [edit unified-edge cos-cac classifier-profiles *name* qos-class-identifier]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the forwarding class associated with the QoS Class Identifier (QCI) for the QoS classifier profile.

NOTE: If you specify a QCI value, you must specify the forwarding class.

**Options** *class-name*—Specify the forwarding class name; for example, assured-forwarding or best-effort.

**Range:** Up to 64 characters

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring a Classifier Profile for 3G and 4G Networks on page 338
- Configuring QoS on the Broadband Gateway Overview on page 333
- qos-class-identifier (Classifier Profiles) on page 961
- Quality of Service Overview on page 318

## gbr-bandwidth-pools (Class of Service)

**Syntax**

```
gbr-bandwidth-pools {
  name {
    downgrade-gtp-v1-gbr-bearers;
    maximum-bandwidth maximum-bandwidth;
  }
}
```

**Hierarchy Level** [edit unified-edge cos-cac]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the bandwidth pools for guaranteed bit rate (GBR) PDP contexts class-of-service call admission control (CoS-CAC) on the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW).

A GBR bandwidth pool limits the number of GBR packet data protocol (PDP) contexts that can be supported on the GGSN or P-GW, at the gateway level or the access point name (APN) level. Configuring a GBR bandwidth pool provides sufficient bandwidth for PDP contexts to be created or modified. Call admission control (CAC) uses the GBR bandwidth pools to negotiate and reserve bandwidth for PDP contexts with a guaranteed bit rate.

**Options** *name*—Name of the GBR bandwidth pool that can be attached, via the local policy, to the APN or gateway.

**Range:** Up to 64 characters

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Call Admission Control Overview on page 324
- Configuring Bandwidth Pools on page 335
- Configuring QoS on the Broadband Gateway Overview on page 333
- cos-cac on page 911

## gbr-bearer (QoS Policer Action)

**Syntax**

```
gbr-bearer {
  exceed-action (drop | transmit);
  violate-action (set-loss-priority-high | transmit);
}
```

**Hierarchy Level** [edit unified-edge cos-cac cos-policy-profiles *name* policer-action]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the policer action that is applied when the subscriber traffic exceeds the GBR or MBR for GBR PDP contexts. You can specify the policer action for the following:

- When traffic exceeds the configured GBR for PDP contexts.
- When the traffic exceeds the configured maximum bit rate (MBR) in a 3G network.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Policing Subscriber Traffic on the Broadband Gateway Overview on page 328
- policer-action (CoS Policy Profiles) on page 956

## guaranteed-bit-rate-downlink (PDP QoS Control)

**Syntax**

```
guaranteed-bit-rate-downlink {
  gbr-downlink;
  reject;
  upgrade;
}
```

**Hierarchy Level** [edit unified-edge cos-cac cos-policy-profiles *name* pdp-qos-control]

**Description** Configure the guaranteed bit rate (GBR) for downlink traffic for Packet Data Protocol (PDP) contexts (3G).

The GBR defines the minimum bit rate that is expected to be available to the PDP context when required. This means that a certain amount of bandwidth is always reserved for the PDP context, regardless of whether the GBR is used or not. Therefore, a PDP context with a GBR always takes up resources even when there is no traffic.

Table 61 on page 930 explains the different configuration scenarios for this statement.

### Table 61: guaranteed-bit-rate-downlink Configuration Scenarios

| Scenario | Behavior |
|---|---|
| Only ***gbr-downlink*** configured | Create PDP Context Requests with GBR lesser than or equal to the configured GBR value are accepted, and requests greater than the configured GBR are downgraded to the configured GBR and accepted. |
| ***gbr-downlink*** and **reject** configured | Create PDP Context Requests with GBR lesser than or equal to the configured GBR value are accepted, and requests greater than the configured GBR are rejected. |
| ***gbr-downlink*** and **upgrade** configured | Create PDP Context Requests with GBR lesser than or equal to the configured GBR value are upgraded to the configured GBR, and requests greater than the configured GBR are downgraded to the configured GBR and accepted. |
| ***gbr-downlink***, **reject** and **upgrade** configured | Create PDP Context Requests with GBR lesser than or equal to the configured GBR value are upgraded to the configured GBR, and requests greater than the configured GBR are rejected. |

**Options** ***gbr-downlink***—Specify the GBR in the downlink direction.

NOTE: If you configure the guaranteed-bit-rate-downlink statement, then you must specify the GBR value in the downlink direction.

**Range:** 1 through 256,000 kbps

**reject**—Specify that PDP contexts higher than the specified downlink GBR are rejected.

**upgrade**—Specify that the configured GBR value is applied to the PDP context.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Class of Service (CoS) Policy Profile Overview on page 327
- Quality of Service Overview on page 318
- **pdp-qos-control (CoS Policy Profiles) on page 955**

## guaranteed-bit-rate-uplink (PDP QoS Control)

**Syntax**

```
guaranteed-bit-rate-uplink {
  gbr-uplink;
  reject;
  upgrade;
}
```

**Hierarchy Level** [edit unified-edge cos-cac cos-policy-profiles *name* pdp-qos-control]

**Description** Configure the guaranteed bit rate (GBR) for uplink traffic for Packet Data Protocol (PDP) contexts (3G).

The GBR defines the minimum bit rate that is expected to be available to the PDP context when required. This means that a certain amount of bandwidth is always reserved for the PDP context, regardless of whether the GBR is used or not. Therefore, a PDP context with a GBR always takes up resources even when there is no traffic.

Table 62 on page 932 explains the different configuration scenarios for this statement.

**Table 62: guaranteed-bit-rate-downlink Configuration Scenarios**

| Scenario | Behavior |
|---|---|
| Only ***gbr-uplink*** configured | Create PDP Context Requests with GBR lesser than or equal to the configured GBR value are accepted, and requests greater than the configured GBR are downgraded to the configured GBR and accepted. |
| ***gbr-uplink*** and **reject** configured | Create PDP Context Requests with GBR lesser than or equal to the configured GBR value are accepted, and requests greater than the configured GBR are rejected. |
| ***gbr-uplink*** and **upgrade** configured | Create PDP Context Requests with GBR lesser than or equal to the configured GBR value are upgraded to the configured GBR, and requests greater than the configured GBR are downgraded to the configured GBR and accepted. |
| ***gbr-uplink***, **reject** and **upgrade** configured | Create PDP Context Requests with GBR lesser than or equal to the configured GBR value are upgraded to the configured GBR, and requests greater than the configured GBR are rejected. |

**Options** ***gbr-uplink***—Specify the GBR in the uplink direction.

NOTE: If you configure the guaranteed-bit-rate-uplink statement, then you must specify the GBR value in the uplink direction.

**Range:** 1 through 256,000 kbps

**reject**—Specify that PDP contexts higher than the specified uplink GBR are rejected.

**upgrade**—Specify that PDP contexts higher than the specified uplink GBR are upgraded.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Class of Service (CoS) Policy Profile Overview on page 327
- Quality of Service Overview on page 318
- **pdp-qos-control (CoS Policy Profiles) on page 955**

## high (Resource Threshold Profiles)

**Syntax**

```
high {
   percentage percentage;
   priority-level priority-level;
}
```

**Hierarchy Level**

[edit unified-edge cos-cac resource-threshold-profiles *name* bearers-load],
[edit unified-edge cos-cac resource-threshold-profiles *name* cpu],
[edit unified-edge cos-cac resource-threshold-profiles *name* memory]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.

**Description**

Specify the upper threshold limit for the bearer load, CPU load, or memory load. You can specify the upper threshold limit as a percentage of the maximum threshold.

When the bearer load, CPU load, or memory load exceeds the corresponding specified threshold percentage, then only Create Session requests or Create Bearer (Serving Gateway only) requests equal to or higher than the specified priority level are accepted.

**Default**

If you do not include this statement, then the following defaults apply:

- Upper limit of 85 percent and priority level of 5 for bearer load or CPU load
- Upper limit of 90 percent and priority level of 5 for memory load

**Options**

**percentage *percentage***—Upper limit (in percent) of the maximum resource threshold.

NOTE: If you include the high statement, then the upper limit must be specified.

**Range:** 1 through 100

**priority-level *priority-level***—Upper limit bearer priority level.

**Range:** 1 through 15

**Default:** 5

**Required Privilege Level**

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Call Admission Control Overview on page 324
- bearers-load (Resource Threshold Profiles) on page 906
- cpu (Resource Threshold Profiles) on page 917
- memory (Resource Threshold Profiles) on page 952

## inet-precedence (Egress Rewrite Rules)

**Syntax**

```
[inet-precedence (rewrite-rule-name | default)] {
  protocol [(gtp-inet-both | gtp-inet-outer)];
}
```

**Hierarchy Level** [edit class-of-service interfaces mif unit *interface-unit-number* rewrite-rules]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the IP precedence egress rewrite rule for the mobile interface. The rewrite rule changes the IP precedence value in the IP header of downstream (Gi to Gn or SGi to S5 traffic) subscriber packets. The rewrite rule can be applied to the inner IP header, the outer IP header, or both inner and outer IP header.

**Options** ***rewrite-rule-name***—Name of the rewrite rule.

NOTE: The rewrite rule must be previously defined at the [edit class-of-service rewrite-rules inet-precedence] hierarchy level.

**default**—Apply the default rewrite rule.

The remaining statement is explained separately

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Applying Egress Rewrite Rules to Mobile Interfaces on page 358
- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- rewrite-rules (Egress) on page 964

## inet-precedence (Ingress Rewrite Rules)

**Syntax** [inet-precedence (*rewrite-rule-name* | default)];

**Hierarchy Level** [edit class-of-service interfaces mif unit *interface-unit-number* ingress-rewrite-rules]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the IP precedence ingress rewrite rule for the mobile interface. The rewrite rule changes the IP precedence value only in the outer IP header of upstream (Gn to Gi or S5 to SGi traffic) subscriber packets .

**Options** ***rewrite-rule-name***—Name of the rewrite rule.

NOTE: The rewrite rule must be previously defined at the [edit class-of-service rewrite-rules inet-precedence] hierarchy level.

**default**—Apply the default rewrite rule.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Applying Ingress Rewrite Rules to a Mobile Interface on page 357
- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- ingress-rewrite-rules on page 937

## ingress-rewrite-rules

**Syntax**

```
ingress-rewrite-rules {
  [dscp (rewrite-rule-name | default)];
  [dscp-ipv6 (rewrite-rule-name | default)];
  [inet-precedence (rewrite-rule-name | default)];
  }
}
```

**Hierarchy Level** [edit class-of-service interfaces mif unit *logical-unit-number*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Apply a previously configured ingress rewrite rule to the mobile interface. The rewrite rule is applied to upstream (Gn to Gi or S5 to SGi traffic) subscriber packets at the mobile interface and rewrites only into the outer IP header of the subscriber packet.

NOTE: The rewrite rule must be previously defined at the [edit class-of-service rewrite-rules] hierarchy level.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Applying Ingress Rewrite Rules to a Mobile Interface on page 357
- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- unit (Mobile Interface for Class of Service) on page 968

## interfaces (Class of Service)

**Syntax**

```
interfaces {
  mif. number {
    unit logical-unit-number {
      ingress-rewrite-rules {
        [dscp (rewrite-rule-name | default)];
        [dscp-ipv6 (rewrite-rule-name | default)];
        [inet-precedence (rewrite-rule-name | default)];
        }
      }
      rewrite-rules {
        [dscp (rewrite-rule-name | default)] {
          protocol [(gtp-inet-both | gtp-inet-outer)];
        }
        [dscp-ipv6 (rewrite-rule-name | default)] {
          protocol [(mpls | gtp-inet-both | gtp-inet-outer)];
        }
        [inet-precedence (rewrite-rule-name | default)] {
          protocol [(gtp-inet-both | gtp-inet-outer)];
        }
      }
    }
  }
}
```

**Hierarchy Level** [edit class-of-service]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the mobile interfaces to set the CoS values for upstream and downstream subscriber packets.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- Applying Ingress Rewrite Rules to a Mobile Interface on page 357
- class-of-service (MobileNext Broadband Gateway) on page 909

## local-policies (QoS)

**Syntax**

```
local-policies {
  policy-name {
    cos-policy-profile name;
    classifier-profile name;
    description description;
    dl-bandwidth-pool name;
    resource-threshold-profile name;
    roamer-classifier-profile name;
    roamer-cos-policy-profile name;
    ul-bandwidth-pool name;
    visitor-classifier-profile  name;
    visitor-cos-policy-profile name;
  }
}
```

**Hierarchy Level** [edit unified-edge]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the local policy, which defines the quality of service (QoS) to be applied at the gateway level or at the access point name (APN) level for the broadband gateway. A local policy applied at the APN level takes priority over a local policy applied at the gateway level. A local policy defines traffic by classes and specifies the different levels of throughput and packet loss when congestion occurs.

The remaining statements are explained separately.

**Options** **policy-name**—Name of the local policy.

**Range:** Up to 64 characters

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- [edit unified-edge local-policies] Hierarchy Level on page 623
- Configuring QoS on the Broadband Gateway Overview on page 333

## local-policy-profile (Broadband Gateway)

**Syntax** local-policy-profile *local-policy-profile*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*],
[edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Specify a local policy profile for the broadband gateway.

- For the broadband gateway configured as a gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW), the local policy profile is a combination of the quality-of-service (QoS) policy (**cos-policy-profile**), the classifier policy (**classifier-profile**), and the resource threshold policy (**resource-threshold-policy**).
- For the broadband gateway configured as a Serving Gateway (S-GW), the local policy profile is a combination of the classifier policy (**classifier-profile**) and the resource threshold policy (**resource-threshold-policy**).

NOTE: The local policy profile must already be configured at the **[edit unified-edge]** hierarchy level.

**Options** ***local-policy-profile***—Name of the local policy profile.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- local-policy-profile (APN) on page 764 (P-GW only)

## loss-priority (QoS Class Identifier)

**Syntax** loss-priority (high | low);

**Hierarchy Level** [edit unified-edge cos-cac classifier-profiles *name* qos-class-identifier]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the packet loss priority associated with the QoS Class Identifier (QCI) for the QoS classifier profile.

NOTE: If you specify a QCI value, you must specify the packet loss priority.

**Options**

**high**—Set the packet loss priority to high, which means that means that packets are more susceptible to being dropped.

**low**—Set the packet loss priority to low, which means that means that packets are less susceptible to being dropped.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring a Classifier Profile for 3G and 4G Networks on page 338
- Configuring QoS on the Broadband Gateway Overview on page 333
- **qos-class-identifier (Classifier Profiles) on page 961**
- Quality of Service Overview on page 318

## low (Resource Threshold Profiles)

**Syntax**

```
low {
  percentage percentage;
  priority-level priority-level;
}
```

**Hierarchy Level**

[edit unified-edge cos-cac resource-threshold-profiles *name* bearers-load],
[edit unified-edge cos-cac resource-threshold-profiles *name* cpu],
[edit unified-edge cos-cac resource-threshold-profiles *name* memory]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.

**Description**

Specify the lower threshold limit for the bearer load, CPU load, or memory load. You can specify the lower threshold limit as a the percentage of the maximum threshold.

When the bearer load, CPU load, or memory load exceeds the corresponding specified threshold percentage, then only Create Session requests or Create Bearer (Serving Gateway only) requests equal to or higher than the specified priority level are accepted.

**Default**

If you do not include this statement, then the following defaults apply:

- Lower limit of 70 percent and priority level of 10 for bearer load or CPU load
- Lower limit of 80 percent and priority level of 10 for memory load

**Options**

**percentage *percentage***—Lower limit (in percent) of the maximum resource threshold.

NOTE: **If you include the low statement, then the lower limit must be specified.**

**Range:** 1 through 100

**priority-level *priority-level***—Lower limit bearer priority level.

**Range:** 1 through 15

**Default:** 10

**Required Privilege Level**

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Call Admission Control Overview on page 324
- bearers-load (Resource Threshold Profiles) on page 906
- cpu (Resource Threshold Profiles) on page 917
- memory (Resource Threshold Profiles) on page 952

## maximum-bandwidth (Guaranteed Bit Rate Bandwidth Pools)

**Syntax** maximum-bandwidth *maximum-bandwidth*;

**Hierarchy Level** [edit unified-edge cos-cac bandwidth-pools *name* gbr-bandwidth-pools *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the total maximum bandwidth for the guaranteed bit rate (GBR) bandwidth pool on the broadband gateway.

NOTE: If you configure a GBR bandwidth pool, then you must configure the total maximum bandwidth.

**Options** ***maximum-bandwidth***—Total maximum bandwidth, in megabits per second (Mbps), of the maximum bandwidth pool.

**Range:** 50,000 through 500,000 Mbps

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Call Admission Control Overview on page 324
- Configuring Bandwidth Pools on page 335
- Configuring QoS on the Broadband Gateway Overview on page 333
- **gbr-bandwidth-pools (Class of Service) on page 928**

## maximum-bearers (Broadband Gateway)

**Syntax** maximum-bearers *maximum-bearers*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*],
[edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** For the broadband gateway configured as a gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW), configure the maximum number of Evolved Packet System (EPS) bearers or packet data protocol (PDP) contexts allowed.

For the broadband gateway configured as a Serving Gateway (S-GW), configure the maximum number of EPS bearers allowed.

**Options** ***maximum-bearers***—Maximum number of bearers for the broadband gateway.

**Range:** 100,000 through 12,000,000 bearers

**Default:** 12,000,000 bearers

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring the Maximum Number of Bearers on page 334
- maximum-bearers (APN) on page 766 (P-GW only)

## maximum-bit-rate-downlink (Aggregated QoS Control)

**Syntax**

```
maximum-bit-rate-downlink {
  mbr-downlink;
  reject;
  upgrade;
}
```

**Hierarchy Level** [edit unified-edge cos-cac cos-policy-profiles *name* aggregated-qos-control]

**Description** Configure the aggregate maximum bit rate (AMBR) for downlink traffic.

The AMBR specifies the total maximum bit rate (MBR) for all non-GBR bearers (4G) associated with a specific gateway or access point name (APN). Table 63 on page 945 explains the different configuration scenarios for this statement.

### Table 63: maximum-bit-rate-downlink Configuration Scenarios

| Scenario | Behavior |
|---|---|
| Only ***mbr-downlink*** configured | Create Session Requests with AMBR lesser than or equal to the configured AMBR value are accepted, and requests greater than the configured AMBR are downgraded to the configured AMBR and accepted. |
| ***mbr-downlink*** and **reject** configured | Create Session Requests with AMBR lesser than or equal to the configured AMBR value are accepted, and requests greater than the configured AMBR are rejected. |
| ***mbr-downlink*** and **upgrade** configured | Create Session Requests with AMBR lesser than or equal to the configured AMBR value are upgraded to the configured AMBR, and requests greater than the configured AMBR are downgraded to the configured AMBR and accepted. |
| ***mbr-downlink***, **reject** and **upgrade** configured | Create Session Requests with AMBR lesser than or equal to the configured AMBR value are upgraded to the configured AMBR, and requests greater than the configured AMBR are rejected. |

**Options** ***mbr-downlink***—Specify the MBR in the downlink direction.

NOTE: If you configure the **maximum-bit-rate-downlink** statement, then you must specify the MBR value in the downlink direction.

**Range:** 1 through 256,000 kbps

**reject**—Specify that bearers higher than the specified downlink MBR are rejected.

**upgrade**—Specify that the configured MBR value is applied to the bearer.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Class of Service (CoS) Policy Profile Overview on page 327
- Quality of Service Overview on page 318
- **aggregated-qos-control (CoS Policy Profiles) on page 901**

## maximum-bit-rate-downlink (PDP QoS Control)

**Syntax**

```
maximum-bit-rate-downlink {
  mbr-downlink;
  reject;
  upgrade;
}
```

**Hierarchy Level** [edit unified-edge cos-cac cos-policy-profiles *name* pdp-qos-control],
[edit unified-edge cos-cac cos-policy-profiles *name* pdp-qos-control qci *qci-value*]

**Description** Configure the maximum bit rate (MBR) for downlink traffic for Packet Data Protocol (PDP) contexts (3G).

The MBR defines the maximum bit rate that is expected to be available to the PDP context when required. The MBR limits the bit rate that is provided to a PDP context.

Table 64 on page 947 explains the different configuration scenarios for this statement.

### Table 64: maximum-bit-rate-downlink Configuration Scenarios

| Scenario | Behavior |
|---|---|
| Only ***mbr-downlink*** configured | Create PDP Context Requests with MBR lesser than or equal to the configured MBR value are accepted, and requests greater than the configured MBR are downgraded to the configured MBR and accepted. |
| ***mbr-downlink*** and **reject** configured | Create PDP Context Requests with MBR lesser than or equal to the configured MBR value are accepted, and requests greater than the configured MBR are rejected. |
| ***mbr-downlink*** and **upgrade** configured | Create PDP Context Requests with MBR lesser than or equal to the configured MBR value are upgraded to the configured MBR, and requests greater than the configured MBR are downgraded to the configured MBR and accepted. |
| ***mbr-downlink***, **reject** and **upgrade** configured | Create PDP Context Requests with MBR lesser than or equal to the configured MBR value are upgraded to the configured MBR, and requests greater than the configured MBR are rejected. |

NOTE: The configuration at the **[edit unified-edge cos-cac cos-policy-profiles *name* pdp-qos-control qci *qci-value*]** hierarchy level takes precedence over the configuration at the **[edit unified-edge cos-cac cos-policy-profiles *name* pdp-qos-control]** hierarchy level.

**Options** ***mbr-downlink***—Specify the MBR in the downlink direction.

NOTE: If you configure the **maximum-bit-rate-downlink** statement, then you must specify the MBR value in the downlink direction.

**Range:** 1 through 256,000 kbps

**reject**—Specify that PDP contexts higher than the specified downlink MBR are rejected.

**upgrade**—Specify that the configured MBR value is applied to PDP contexts.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Class of Service (CoS) Policy Profile Overview on page 327
- Quality of Service Overview on page 318
- **pdp-qos-control (CoS Policy Profiles) on page 955**
- **qci (PDP QoS Control) on page 960**

## maximum-bit-rate-uplink (Aggregated QoS Control)

**Syntax**

```
maximum-bit-rate-uplink {
  mbr-uplink;
  reject;
  upgrade;
}
```

**Hierarchy Level** [edit unified-edge cos-cac cos-policy-profiles *name* aggregated-qos-control]

**Description** Configure the aggregate maximum bit rate (AMBR) for uplink traffic.

The AMBR specifies the total maximum bit rate (MBR) for all non-GBR bearers (4G) associated with a specific gateway or access point name (APN). Table 65 on page 949 explains the different configuration scenarios for this statement.

### Table 65: maximum-bit-rate-uplink Configuration Scenarios

| Scenario | Behavior |
|---|---|
| Only ***mbr-uplink*** configured | Create Session Requests with AMBR lesser than or equal to the configured AMBR value are accepted, and requests greater than the configured AMBR are downgraded to the configured AMBR and accepted. |
| ***mbr-uplink*** and **reject** configured | Create Session Requests with AMBR lesser than or equal to the configured AMBR value are accepted, and requests greater than the configured AMBR are rejected. |
| ***mbr-uplink*** and **upgrade** configured | Create Session Requests with AMBR lesser than or equal to the configured AMBR value are upgraded to the configured AMBR, and requests greater than the configured AMBR are downgraded to the configured AMBR and accepted. |
| ***mbr-uplink***, **reject** and **upgrade** configured | Create Session Requests with AMBR lesser than or equal to the configured AMBR value are upgraded to the configured AMBR, and requests greater than the configured AMBR are rejected. |

**Options** ***mbr-uplink***—Specify the MBR in the uplink direction.

NOTE: If you configure the maximum-bit-rate-uplink statement, then you must specify the MBR value in the uplink direction.

**Range:** 1 through 256,000 kbps

**reject**—Specify that bearers higher than the specified uplink MBR are rejected.

**upgrade**—Specify that the configured MBR value is applied to the bearer.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Class of Service (CoS) Policy Profile Overview on page 327
- Quality of Service Overview on page 318
- **aggregated-qos-control (CoS Policy Profiles) on page 901**

## maximum-bit-rate-uplink (PDP QoS Control)

**Syntax**

```
maximum-bit-rate-uplink {
  mbr-uplink;
  reject;
  upgrade;
}
```

**Hierarchy Level** [edit unified-edge cos-cac cos-policy-profiles *name* pdp-qos-control],
[edit unified-edge cos-cac cos-policy-profiles *name* pdp-qos-control qci *qci-value*]

**Description** Configure the maximum bit rate (MBR) for uplink traffic for Packet Data Protocol (PDP) contexts.

The MBR defines the maximum bit rate that is expected to be available to the PDP context when required. The MBR limits the bit rate that is provided to a PDP context.

Table 66 on page 951 explains the different configuration scenarios for this statement.

### Table 66: maximum-bit-rate-uplink Configuration Scenarios

| Scenario | Behavior |
|---|---|
| Only ***mbr-uplink*** configured | Create PDP Context Requests with MBR lesser than or equal to the configured MBR value are accepted, and requests greater than the configured MBR are downgraded to the configured MBR and accepted. |
| ***mbr-uplink*** and **reject** configured | Create PDP Context Requests with MBR lesser than or equal to the configured MBR value are accepted, and requests greater than the configured MBR are rejected. |
| ***mbr-uplink*** and **upgrade** configured | Create PDP Context Requests with MBR lesser than or equal to the configured MBR value are upgraded to the configured MBR, and requests greater than the configured MBR are downgraded to the configured MBR and accepted. |
| ***mbr-uplink***, **reject** and **upgrade** configured | Create PDP Context Requests with MBR lesser than or equal to the configured MBR value are upgraded to the configured MBR, and requests greater than the configured MBR are rejected. |

NOTE: The configuration at the **[edit unified-edge cos-cac cos-policy-profiles *name* pdp-qos-control qci *qci-value*]** hierarchy level takes precedence over the configuration at the **[edit unified-edge cos-cac cos-policy-profiles *name* pdp-qos-control]** hierarchy level.

**Options** ***mbr-uplink***—Specify the MBR in the uplink direction.

NOTE: If you configure the **maximum-bit-rate-uplink** statement, then you must specify the MBR value in the uplink direction.

**Range:** 1 through 256,000 kbps

**reject**—Specify that PDP contexts higher than the specified uplink MBR are rejected.

**upgrade**—Specify that the configured MBR value is applied to PDP contexts.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Class of Service (CoS) Policy Profile Overview on page 327
- Quality of Service Overview on page 318
- **pdp-qos-control (CoS Policy Profiles) on page 955**
- **qci (PDP QoS Control) on page 960**

## memory (Resource Threshold Profiles)

**Syntax**

```
memory {
  high {
    percentage percentage;
    priority-level priority-level;
  }
  low {
    percentage percentage;
    priority-level priority-level;
  }
}
```

**Hierarchy Level** [edit unified-edge cos-cac resource-threshold-profiles *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the lower and upper limits for the memory load or utilization (at the session PIC level) in the resource threshold profile. The memory load specifies a precise level of admission control when the memory load or utilization for a session PIC reaches a configured lower or upper threshold.

The remaining statements are explained separately.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Call Admission Control Overview on page 324
- Configuring Resource Thresholds for 3G and 4G Networks on page 337
- **resource-threshold-profiles (QoS) on page 962**

## mif (Class of Service)

**Syntax**

```
mif {
  unit logical-unit-number {
    ingress-rewrite-rules {
      [dscp (rewrite-rule-name | default)];
      [dscp-ipv6 (rewrite-rule-name | default)];
      [inet-precedence (rewrite-rule-name | default)];
      }
    }
    rewrite-rules {
      [dscp (rewrite-rule-name | default)] {
        protocol [(gtp-inet-both | gtp-inet-outer)];
      }
      [dscp-ipv6 (rewrite-rule-name | default)] {
        protocol [(mpls | gtp-inet-both | gtp-inet-outer)];
      }
      [inet-precedence (rewrite-rule-name | default)] {
        protocol [(gtp-inet-both | gtp-inet-outer)];
      }
    }
  }
}
```

**Hierarchy Level** [edit class-of-service interfaces]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the mobile interface for applying ingress and egress rewrite rules to upstream and downstream subscriber packets.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- Applying Ingress Rewrite Rules to a Mobile Interface on page 357
- interfaces (Class of Service) on page 938

## non-gbr-bearer (QoS Policer Action)

**Syntax**

```
non-gbr-bearer {
  violate-action (set-loss-priority-high | transmit);
}
```

**Hierarchy Level** [edit unified-edge cos-cac cos-policy-profiles *name* policer-action]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the policer action that is applied when the subscriber traffic exceeds the MBR rate for non-GBR PDP contexts (3G) or AMBR for non-GBR bearers (4G). You can specify the policer action to take when the traffic exceeds the configured maximum bit rate (MBR) in a 3G network, or when the traffic the exceeds the configured aggregate maximum bit rate (AMBR) in a 4G network.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Policing Subscriber Traffic on the Broadband Gateway Overview on page 328
- policer-action (CoS Policy Profiles) on page 956

## pdp-qos-control (CoS Policy Profiles)

**Syntax**

```
pdp-qos-control {
  guaranteed-bit-rate-downlink {
    gbr-downlink;
    reject;
    upgrade;
  }
  guaranteed-bit-rate-uplink {
    gbr-uplink;
    reject;
    upgrade;
  }
  maximum-bit-rate-downlink {
    mbr-downlink;
    reject;
    upgrade;
  }
  maximum-bit-rate-uplink {
    mbr-uplink;
    reject;
    upgrade;
  }
  qci qci-value {
    maximum-bit-rate-downlink {
      mbr-downlink;
      reject;
      upgrade;
    }
    maximum-bit-rate-uplink {
      mbr-uplink;
      reject;
      upgrade;
    }
  }
}
```

**Hierarchy Level** [edit unified-edge cos-cac cos-policy-profiles *name*]

**Description** Configure the QoS parameters for Packet Data Protocol (PDP) contexts (3G). You can configure the guaranteed bit rate (GBR) and maximum bit rate (MBR) for both uplink and downlink traffic applicable to all QCI values. You can also configure the MBR for a specific QCI value, which takes precedence over the configuration at the higher (**[edit unified-edge cos-cac cos-policy-profiles *name* pdp-qos-control]**) hierarchy level.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Class of Service (CoS) Policy Profile Overview on page 327
- Configuring a CoS Policy Profile for 3G and 4G Networks on page 348

- Configuring a CoS Policy Profile for 3G Networks on page 343
- Configuring a CoS Policy Profile for 4G Networks on page 340
- Quality of Service Overview on page 318
- cos-policy-profiles on page 915

## policer-action (CoS Policy Profiles)

**Syntax**

```
policer-action {
  gbr-bearer {
    exceed-action (drop | transmit);
    violate-action (set-loss-priority-high | transmit);
  }
  non-gbr-bearer {
    violate-action (set-loss-priority-high | transmit);
  }
}
```

**Hierarchy Level** [edit unified-edge cos-cac cos-policy-profiles *name*]

**Description** Configure the policer actions that are applied when the subscriber traffic exceeds the maximum or guaranteed bit rates. The broadband gateway uses a two-rate policer to enforce bandwidth rates for subscriber traffic.

NOTE: This configuration is applicable only for the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW).

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Policing Subscriber Traffic on the Broadband Gateway Overview on page 328
- cos-policy-profiles on page 915

## preemption (GGSN or P-GW)

**Syntax**

```
preemption {
  enable;
  gtpv1-pci-disable;
  gtpv1-pvi-disable;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure whether preemption should be enabled or disabled on the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW). Preemption aids in call admission control and enables the gateway to accommodate higher priority bearers over the lower priority ones, based on the Preemption Capability Indicator (PCI) and Preemption Vulnerability Indicator (PVI).

The PCI value defines whether a bearer with a lower priority level (PL) should be dropped to free the resources required. The PVI value defines whether a bearer is liable to be dropped in favor of a preemption-capable bearer with a higher priority level value.

Preemption can be applied based on bearer load or memory load, both of which can be configured at the **[edit unified-edge cos-cac resource-threshold-profiles]** hierarchy level.

NOTE: The gtpv1-pci and gtpv1-pvi values are valid only for General Packet Radio Service (GPRS) tunneling protocol version 1 (GTPv1) subscribers.

**Options**

**enable**—Enable preemption on the GGSN or P-GW.

If you do not specify a value, preemption is disabled by default.

**gtpv1-pci-disable**—Disable the preemption capability indicator for GTPv1 subscribers.

If you do not specify a value, the preemption capability indicator is enabled by default.

**gtpv1-pvi-disable**—Disable the preemption vulnerability indicator for GTPv1 subscribers.

If you do not specify a value, the preemption vulnerability indicator is enabled by default.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Preemption for Call Admission Control on page 336

## preemption (Serving Gateway)

**Syntax**

```
preemption {
  enable;
}
```

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure whether preemption should be enabled or disabled on the Serving Gateway (S-GW). Preemption aids in call admission control and enables the gateway to accommodate higher priority bearers over the lower priority ones, based on the Preemption Capability Indicator (PCI) and Preemption Vulnerability Indicator (PVI).

The PCI value defines whether a bearer with a lower priority level (PL) should be dropped to free the resources required. The PVI value defines whether a bearer is liable to be dropped in favor of a preemption-capable bearer with a higher priority level value.

Preemption can be applied based on bearer load or memory load, both of which can be configured at the **[edit unified-edge cos-cac resource-threshold-profiles]** hierarchy level.

NOTE: In the S-GW, only bearers that are of the same type can preempt each other: guaranteed bit rate (GBR) bearers can preempt only GBR bearers, and non-GBR bearers can preempt only non-GBR bearers.

**Default** If you do not configure this statement, preemption is disabled by default.

**Options** **enable**—Enable preemption on the S-GW.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring an S-GW on a Broadband Gateway on page 29

## protocol (Egress Rewrite Rules)

**Syntax** protocol [*protocol-type*];

**Hierarchy Level** [edit class-of-service interfaces mif unit *interface-unit-number* rewrite-rules dscp],
[edit class-of-service interfaces mif unit *interface-unit-number* rewrite-rules dscp-ipv6],
[edit class-of-service interfaces mif unit *interface-unit-number* rewrite-rules inet-precedence]

**Description** Specify where the egress rewrite rule should be applied to downstream (Gi to Gn or S5 to SGi traffic) subscriber packets.

**Default** If this statement is not configured, then the egress rewrite rules are applied to the inner IP header only.

**Options** ***protocol-type***—Apply the rewrite rule to one or more of the following:

- **mpls**—(DSCP IPv6 only) IPv6 packets entering the MPLS tunnel.
- **gtp-inet-outer**—Outer IP header only.
- **gtp-inet-both**—Both inner and outer IP header.

To specify multiple attributes at one time, include the attributes in square brackets ([]).

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- Applying Ingress Rewrite Rules to a Mobile Interface on page 357
- dscp (Egress Rewrite Rules) on page 924
- dscp-ipv6 (Egress Rewrite Rules) on page 922
- inet-precedence (Egress Rewrite Rules) on page 935

## qci (PDP QoS Control)

**Syntax**

```
qci qci-value {
  maximum-bit-rate-downlink {
    mbr-downlink;
    reject;
    upgrade;
  }
  maximum-bit-rate-uplink {
    mbr-uplink;
    reject;
    upgrade;
  }
}
```

**Hierarchy Level** [edit unified-edge cos-cac cos-policy-profiles *name* pdp-qos-control]

**Description** Configure the maximum bit rate (MBR) for both uplink and downlink for QoS Class Identifier (QCI) values for non-guaranteed bit rate (GBR) Packet Data Protocol (PDP) contexts (3G).

The uplink and downlink MBR specified for the QCI value overrides the corresponding uplink and downlink MBR at the **[edit unified-edge cos-cac cos-policy-profiles *name* pdp-qos-control]** hierarchy level.

**Options** ***qci-value***—QCI value.

**Range:** 5 through 9

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Class of Service (CoS) Policy Profile Overview on page 327
- Quality of Service Overview on page 318
- pdp-qos-control (CoS Policy Profiles) on page 955

## qos-class-identifier (Classifier Profiles)

**Syntax**

```
qos-class-identifier qci-value {
  forwarding-class class-name;
  loss-priority (high | low);
}
```

**Hierarchy Level** [edit unified-edge cos-cac classifier-profiles *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the QoS Class Identifier (QCI) mapping for the classifier profile. You can configure the QCI value and the associated forwarding class and packet loss priority based on traffic requirements. You can configure the packet-forwarding treatment by assigning a forwarding class and packet loss priority for each QCI.

NOTE: If you specify a QCI value, you must specify the forwarding class and the packet loss priority.

**Options** ***qci-value***—QCI value.

**Range:** 1 through 9

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring a Classifier Profile for 3G and 4G Networks on page 338
- Configuring QoS on the Broadband Gateway Overview on page 333
- **classifier-profiles on page 908**
- Quality of Service Overview on page 318

## resource-threshold-profiles (QoS)

**Syntax**

```
resource-threshold-profiles {
  name {
    bearers-load {
      high {
        percentage percentage;
        priority-level priority-level;
      }
      low {
        percentage percentage;
        priority-level priority-level;
      }
    }
    cpu {
      high {
        percentage percentage;
        priority-level priority-level;
      }
      low {
        percentage percentage;
        priority-level priority-level;
      }
    }
    description description;
    memory {
      high {
        percentage percentage;
        priority-level priority-level;
      }
      low {
        percentage percentage;
        priority-level priority-level;
      }
    }
  }
}
```

**Hierarchy Level** [edit unified-edge cos-cac]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the resource threshold profile. The resource threshold profile ensures that when the bearer load, CPU load, or memory load at the access point name (APN) or the gateway level on the broadband gateway reaches a specified threshold, then only Create Session requests or Create Bearer (Serving Gateway only) requests with a priority higher than what is configured are allowed.

NOTE: Even though the configuration of resource threshold profiles is not mandatory, the default values for the upper and lower threshold limits for various loads are applied at the gateway level. There are no defaults at the APN level.

**Options** *name*—Name of the resource threshold profile.

**Range:** Up to 64 characters

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**
- Call Admission Control Overview on page 324
- Configuring Resource Thresholds for 3G and 4G Networks on page 337
- cos-cac on page 911

## resource-threshold-profile (Local Policies)

**Syntax** resource-threshold-profile *profile-name*;

**Hierarchy Level** [edit unified-edge local-policies *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the resource threshold profile for the local policy. The resource threshold profile specifies the limit for the bearer load, CPU load, or memory load.

**Options** *profile-name*—Name of the resource threshold profile.

NOTE: The resource threshold profile must be previously configured on the broadband gateway at the [edit unified-edge cos-cac resource-threshold-profiles] hierarchy level.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Configuring a Local Policy on page 354
- Configuring QoS on the Broadband Gateway Overview on page 333
- resource-threshold-profiles (QoS) on page 962
- local-policies (QoS) on page 939

## rewrite-rules (Egress)

**Syntax**

```
rewrite-rules {
  [dscp (rewrite-rule-name | default)] {
    protocol [(gtp-inet-both | gtp-inet-outer)];
  }
  [dscp-ipv6 (rewrite-rule-name | default)] {
    protocol [(mpls | gtp-inet-both | gtp-inet-outer)];
  }
  [inet-precedence (rewrite-rule-name | default)] {
    protocol [(gtp-inet-both | gtp-inet-outer)];
  }
}
```

**Hierarchy Level** [edit class-of-service interfaces mif unit *logical-unit-number*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Apply a previously configured egress rewrite rule to the mobile interface. The rewrite rule is applied to the downstream (Gi to Gn or SGi to S5 traffic) subscriber packets. The rewrite rule can be applied to the inner IP header, the outer IP header, or both inner and outer IP header.

NOTE: The rewrite rule must be previously defined at the [edit class-of-service rewrite-rules] hierarchy level.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- Applying Egress Rewrite Rules to Mobile Interfaces on page 358
- unit (Mobile Interface for Class of Service) on page 968

## roamer-classifier-profile (Local Policies)

**Syntax** roamer-classifier-profile *profile-name*;

**Hierarchy Level** [edit unified-edge local-policies *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the classifier profile for roaming subscribers. A classifier profile defines the packet forwarding treatment for each bearer depending on its QoS Class Identifiers (QCIs).

**Options** ***profile-name***—Name of the roamer classifier profile.

NOTE: **The classifier policy profile must be previously configured on the broadband gateway at the [edit unified-edge cos-cac classifier-profiles] hierarchy level.**

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring a Local Policy on page 354
- Configuring QoS on the Broadband Gateway Overview on page 333
- **classifier-profiles on page 908**
- **local-policies (QoS) on page 939**

## roamer-cos-policy-profile (Local Policies)

**Syntax** roamer-cos-policy-profile *profile-name*;

**Hierarchy Level** [edit unified-edge local-policies *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the CoS policy profile for roaming subscribers. You configure a CoS policy profile to define policies for limiting, upgrading, or rejecting calls based on the requested QoS parameters.

**Options** ***profile-name***—Name of the roamer CoS policy profile.

NOTE: The CoS policy profile must be previously configured on the broadband gateway at the [edit unified-edge cos-cac cos-policy-profiles] hierarchy level.

**Required Privilege Level** interface, unified-edge—To view this statement in the configuration.
interface-control, unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring a Local Policy on page 354
- Configuring QoS on the Broadband Gateway Overview on page 333
- cos-policy-profiles on page 915
- local-policies (QoS) on page 939

## ul-bandwidth-pool (Local Policies)

**Syntax** ul-bandwidth-pool *pool-name* ;

**Hierarchy Level** [edit unified-edge local-policies *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the bandwidth pool for limiting the downlink bandwidth usage at the gateway or at the APN level.

**Options** ***pool-name***—Name of the uplink bandwidth pool.

NOTE: The bandwidth pool must be previously configured on the broadband gateway at the [edit unified-edge cos-cac gbr-bandwidth-pools] hierarchy level.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring a Local Policy on page 354
- Configuring QoS on the Broadband Gateway Overview on page 333
- gbr-bandwidth-pools (Class of Service) on page 928
- local-policies (QoS) on page 939

## unit (Mobile Interface for Class of Service)

**Syntax**

```
unit logical-unit-number {
  ingress-rewrite-rules {
    [dscp (rewrite-rule-name | default)];
    [dscp-ipv6 (rewrite-rule-name | default)];
    [inet-precedence (rewrite-rule-name | default)];
    }
  }
  rewrite-rules {
    [dscp (rewrite-rule-name | default)] {
      protocol [(gtp-inet-both | gtp-inet-outer)];
    }
    [dscp-ipv6 (rewrite-rule-name | default)] {
      protocol [(mpls | gtp-inet-both | gtp-inet-outer)];
    }
    [inet-precedence (rewrite-rule-name | default)] {
      protocol [(gtp-inet-both | gtp-inet-outer)];
    }
  }
}
```

**Hierarchy Level** [edit class-of-service interfaces mif]

**Description** Specify a logical interface on the physical device. You must configure a logical interface to be able to use the physical device.

**Options** *logical-unit-number*—Number of the logical unit

**Range:** 0 through 16,384

The remaining statements are explained separately.

**Required Privilege Level**

**Related Documentation**

- Applying Rewrite Rules on Mobile Interfaces Overview on page 329
- Applying Ingress Rewrite Rules to a Mobile Interface on page 357
- mif (Class of Service) on page 953

## violate-action (QoS Policer Action)

**Syntax** violate-action (set-loss-priority-high | transmit);

**Hierarchy Level** [edit unified-edge cos-cac cos-policy-profiles *name* policer-action gbr-bearer],
[edit unified-edge cos-cac cos-policy-profiles *name* policer-action non-gbr-bearer]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the policer action that is applied when the subscriber traffic exceeds the configured maximum bit rate (MBR) in a 3G network, or when the traffic the exceeds the configured aggregate maximum bit rate (AMBR) in a 4G network. The policer action controls packet behavior by dropping the packet, setting the packet loss priority (PLP) to high, or transmitting the packet without changing the PLP.

You can configure this policer action for both guaranteed bit rate (GBR) PDP contexts, and non-GBR bearers or PDP contexts.

**Default** If you do not include this statement, then the default action is to drop the packet.

**Options** **set-loss-priority-high**—Set the PLP to high.

**transmit**—Transmit the packet without changing the PLP.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring QoS on the Broadband Gateway Overview on page 333
- gbr-bearer (QoS Policer Action) on page 929
- non-gbr-bearer (QoS Policer Action) on page 954

## visitor-classifier-profile (Local Policies)

**Syntax** visitor-classifier-profile *profile-name*;

**Hierarchy Level** [edit unified-edge local-policies *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the classifier profile for visiting subscribers. A classifier profile defines the packet forwarding treatment for each bearer depending on its QoS Class Identifiers (QCIs).

**Options** ***profile-name***—Name of the visitor classifier profile.

NOTE: The classifier policy profile must be previously configured on the broadband gateway at the [edit unified-edge cos-cac classifier-profiles] hierarchy level.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring a Local Policy on page 354
- Configuring QoS on the Broadband Gateway Overview on page 333
- classifier-profiles on page 908
- local-policies (QoS) on page 939

## visitor-cos-policy-profile (Local Policies)

**Syntax** visitor-cos-policy-profile *profile-name*;

**Hierarchy Level** [edit unified-edge local-policies *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the CoS policy profile for visiting subscribers. You configure a CoS policy profile to define policies for limiting, upgrading, or rejecting calls based on the requested QoS parameters.

**Options** ***profile-name***—Name of the visitor CoS policy profile.

NOTE: The CoS policy profile must be previously configured on the broadband gateway at the [edit unified-edge cos-cac cos-policy-profiles] hierarchy level.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring a Local Policy on page 354
- Configuring QoS on the Broadband Gateway Overview on page 333
- cos-policy-profiles on page 915
- local-policies (QoS) on page 939

CHAPTER 24

# Exception Handling Configuration Statements

## current-hop-limit (IPv6 Router Advertisement)

**Syntax** current-hop-limit *current-hop-limit*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* ipv6-router-advertisement]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the value to be placed in the **current-hop-limit** field of the IPv6 router advertisement messages sent from the broadband gateway. This value is used as the hop limit in the outgoing IPv6 packets sent from the user equipment (UE).

**Options** *current-hop-limit*—Current hop limit for the IPv6 router advertisement.

**Range:** 0 through 3

**Default:** 0. The hop limit is not specified by the broadband gateway.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring IPv6 Protocol Parameters on page 93
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105
- **ipv6-router-advertisement (MobileNext Broadband Gateway) on page 979**

## disable (IPv6 Router Advertisement)

**Syntax** disable;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* ipv6-router-advertisement]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Disable IPv6 router advertisement for the broadband gateway. By default, IPv6 router advertisement is enabled for the broadband gateway.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring IPv6 Protocol Parameters on page 93
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105
- **ipv6-router-advertisement (MobileNext Broadband Gateway) on page 979**

## error-indication-interval

**Syntax** error-indication-interval *interval-in-seconds*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* gtp data]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the interval at which the broadband gateway generates an error indication to the peer per bearer. One error indication is generated per bearer for the interval configured, in seconds.

**Options** ***interval-in-seconds***—Error indication interval.
**Range:** 1 through 20 seconds
**Default:** 2 seconds

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services on the Data Plane on page 240
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105
- **data (GTP) on page 998**

## inline-services (IP Reassembly)

**Syntax**

```
inline-services {
  ip-reassembly;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*],
[edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure inline services for the broadband gateway. Currently, IP reassembly is the only inline service supported.

When fragments arrive at the gateway for reassembly, they can be reassembled inline, in the hardware (inline IP reassembly), or using software on the services PIC (software reassembly). The **ip-reassembly** statement lets you specify that fragments should be reassembled inline.

NOTE: Inline IP reassembly can only be carried out on Trio-based FPCs.

The remaining statement is explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- [edit unified-edge gateways] Hierarchy Level on page 604
- Example: Configuring Inline IP Packet Fragment Reassembly on page 99

## ip-reassembly

**Syntax**

```
ip-reassembly {
  profile profile-name {
    max-reassembly-pending-packets number;
    timeout in-seconds;
  }
}
```

**Hierarchy Level** [edit services]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure an IP reassembly profile to be applied to the broadband gateway.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- [edit services ip-reassembly] Hierarchy Level on page 599
- Configuring Fragment Reassembly Parameters on page 91
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105

## ip-reassembly (Inline Services)

**Syntax** ip-reassembly;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* inline-services],
[edit unified-edge gateways sgw *gateway-name* inline-services]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify that the reassembly of fragmented IP packets should be carried out inline, on the packet forwarding engine.

When fragments arrive at the gateway for reassembly, they can be reassembled inline, in the hardware (inline IP reassembly), or using software on the services PIC (software reassembly). If you do not include this statement, then, by default, IP reassembly is carried on the services PIC for all gateways.

NOTE: Inline IP reassembly can only be carried out on Trio-based FPCs.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Example: Configuring Inline IP Packet Fragment Reassembly on page 99
- inline-services (IP Reassembly) on page 975

## ip-reassembly-profile

**Syntax**

```
ip-reassembly-profile {
  profile-name;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*],
[edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the [edit unified-edge gateways sgw *gateway-name*] hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Apply a previously configured IP reassembly profile to the broadband gateway.

NOTE: **Currently, only one IP reassembly profile is allowed for the broadband gateway.**

**Options** ***profile-name***—Name of the IP reassembly profile to be applied.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- [edit unified-edge gateways] Hierarchy Level on page 604
- Configuring Fragment Reassembly Parameters on page 91
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105

## ipv6-router-advertisement (MobileNext Broadband Gateway)

**Syntax**

```
ipv6-router-advertisement {
  current-hop-limit current-hop-limit;
  disable;
  maximum-advertisement-interval maximum-advertisement-interval;
  maximum-initial-advertisement-interval maximum-initial-advertisement-interval;
  maximum-initial-advertisements maximum-initial-advertisements;
  minimum-advertisement-interval minimum-advertisement-interval;
  reachable-time reachable-time;
  retransmission-timer retransmission-timer;
  router-lifetime router-lifetime;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure IPv6 router advertisement parameters for the broadband gateway.

The remaining statements are explained separately.

**Default** By default, IPv6 router advertisement is enabled for the broadband gateway.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- [edit unified-edge gateways ggsn-pgw <gateway-name>] Hierarchy Level on page 604
- Configuring IPv6 Protocol Parameters on page 93
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105

## max-reassembly-pending-packets (IP Reassembly)

**Syntax** max-reassembly-pending-packets *number*;

**Hierarchy Level** [edit services ip-reassembly profile *profile-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the maximum number of IPv4 packets pending reassembly that is allowed in each services PIC that belongs to the broadband gateway.

**Options** ***number***—Maximum number of packets pending reassembly allowed in each services PIC.

**Range:** 100 through 10,000

**Default:** 1000

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Fragment Reassembly Parameters on page 91
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105
- **profile (IP Reassembly) on page 985**

## maximum-advertisement-interval (IPv6 Router Advertisement)

**Syntax** maximum-advertisement-interval *maximum-advertisement-interval*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* ipv6-router-advertisement]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the maximum interval between unsolicited router advertisements.

Router advertisements occur in phases. In the initial phase, the interval between the router advertisements is a few seconds. In the later phases, the interval increases to a few minutes. The **maximum-advertisement-interval** parameter controls the interval in the later phases.

**Options** ***maximum-advertisement-interval***—Maximum interval between unsolicited router advertisements.

**Range:** 5400 through 21,600 seconds

**Default:** 21,600 seconds

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring IPv6 Protocol Parameters on page 93
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105
- ipv6-router-advertisement (MobileNext Broadband Gateway) on page 979

## maximum-initial-advertisement-interval (IPv6 Router Advertisement)

**Syntax** maximum-initial-advertisement-interval *maximum-initial-advertisement-interval*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* ipv6-router-advertisement]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the maximum interval between initial router advertisements.

Router advertisements occur in phases. In the initial phase, the interval between the router advertisements is a few seconds. In the later phases, the interval increases to a few minutes. The **maximum-initial-advertisement-interval** parameter controls the interval in the initial phase.

**Options** *maximum-initial-advertisement-interval*—Maximum interval between initial router advertisements.

**Range:** 10 through 16 seconds

**Default:** 10 seconds

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring IPv6 Protocol Parameters on page 93
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105
- ipv6-router-advertisement (MobileNext Broadband Gateway) on page 979

## maximum-initial-advertisements (IPv6 Router Advertisement)

**Syntax** maximum-initial-advertisements *maximum-initial-advertisements*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* ipv6-router-advertisement]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the maximum number of router advertisements sent during the initial phase.

Router advertisements occur in phases. In the initial phase, the router advertisements occur every few seconds. In the later phases, the advertisements occur every few minutes. The **maximum-initial-advertisements** parameter controls the maximum number of advertisements sent during the initial phase.

**Options** ***maximum-initial-advertisements***—Maximum number of initial router advertisements.

**Range:** 2 through 5

**Default:** 3

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring IPv6 Protocol Parameters on page 93
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105
- ipv6-router-advertisement (MobileNext Broadband Gateway) on page 979

## minimum-advertisement-interval (IPv6 Router Advertisement)

**Syntax** minimum-advertisement-interval *minimum-advertisement-interval*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* ipv6-router-advertisement]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the minimum time allowed between the sending of unsolicited router advertisements.

Router advertisements occur in phases. In the initial phase, the interval between the router advertisements is a few seconds. In the later phases, the interval increases to a few minutes. The **minimum-advertisement-interval** parameter controls the interval in the later phases.

**Options** ***minimum-advertisement-interval***—Minimum interval between unsolicited router advertisements.

**Range:** 3600 through 16,200 seconds

**Default:** 16,200 seconds

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring IPv6 Protocol Parameters on page 93
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105
- ipv6-router-advertisement (MobileNext Broadband Gateway) on page 979

## profile (IP Reassembly)

**Syntax**

```
profile profile-name {
    max-reassembly-pending-packets number;
    timeout in-seconds;
}
```

**Hierarchy Level** [edit services ip-reassembly]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure an IP reassembly profile to be applied to the broadband gateway.

The remaining statements are explained separately.

**Options** ***profile-name***—Name of the IP reassembly profile.

NOTE: To create more than one IP reassembly profile, include the profile statement multiple times.

**Range:** 1 through 32 characters

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Fragment Reassembly Parameters on page 91
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105
- ip-reassembly on page 976

## reachable-time (IPv6 Router Advertisement)

**Syntax** reachable-time *reachable-time*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* ipv6-router-advertisement]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the value of the reachable time field of IPv6 router advertisement messages. This is the time (in milliseconds) after which a node (user equipment [UE]) assumes that a neighbor is unreachable after the node had received the initial reachability confirmation. Because the GPRS tunneling protocol (GTP) tunnel behaves like a point-to-point IPv6 link between the user equipment and the gateway, the neighbor for the user equipment is usually the broadband gateway.

**Options** ***reachable-time***—Value of the reachable time field of the IPv6 router advertisement messages.

**Range:** 0 through 3,600,000 milliseconds

**Default:** 0 milliseconds. The reachable time has not been specified by the broadband gateway.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring IPv6 Protocol Parameters on page 93
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105
- ipv6-router-advertisement (MobileNext Broadband Gateway) on page 979

## retransmission-timer (IPv6 Router Advertisement)

**Syntax** retransmission-timer *retransmission-timer*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* ipv6-router-advertisement]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the value of the retransmission timer field of the IPv6 router advertisement messages. The retransmission timer is used to control the time (in milliseconds) between retransmissions of neighbor solicitation messages from the user equipment (UE).

**Options** ***retransmission-timer***—Value of the retransmission timer field of the IPv6 router advertisement messages

**Default:** 0 milliseconds. The retransmission timer has not been specified by the broadband gateway.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring IPv6 Protocol Parameters on page 93
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105
- ipv6-router-advertisement (MobileNext Broadband Gateway) on page 979

## router-lifetime (IPv6 Router Advertisement)

**Syntax** router-lifetime *router-lifetime*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* ipv6-router-advertisement]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the value of the router lifetime field of the IPv6 router advertisement messages. The **router-lifetime** indicates the maximum time up to which the broadband gateway can be considered the default gateway.

**Options** ***router-lifetime***—Value of the router lifetime field of the IPv6 router advertisement messages.

**Range:** 5400 through 21,840 seconds

**Default:** 21,840 seconds

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring IPv6 Protocol Parameters on page 93
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105
- ipv6-router-advertisement (MobileNext Broadband Gateway) on page 979

## software-datapath

**Syntax**

```
software-datapath {
  traceoptions {
    file filename {
      files files;
      match match;
      size size;
      (no-world-readable | world-readable);
    }
    flag {
      flag;
    }
    level level;
    no-remote-trace;
  }
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*],
[edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the [edit unified-edge gateways sgw *gateway-name*] hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the configuration for the software datapath.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- [edit unified-edge gateways] Hierarchy Level on page 604
- Configuring Exception Handling Traceoptions on page 95

## timeout (IP Reassembly)

**Syntax** timeout *in-seconds*;

**Hierarchy Level** [edit services ip-reassembly profile *profile-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the maximum time to wait for all IPv4 fragments of a packet to arrive for reassembly.

**Options** ***in-seconds***—Timeout for the fragments arriving for reassembly.

**Range:** 2 through 60 seconds

**Default:** 4 seconds

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Fragment Reassembly Parameters on page 91
- Example: Configuring Broadband Gateway Exception Handling Parameters on page 105
- **profile (IP Reassembly) on page 985**

## traceoptions (Exception Handling)

**Syntax**

```
traceoptions {
  file filename {
    files files;
    match match;
    size size;
    (no-world-readable | world-readable);
  }
  flag {
    flag;
  }
  level level;
  no-remote-trace;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* software-datapath],
[edit unified-edge gateways sgw *gateway-name* software datapath]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the [edit unified-edge gateways sgw *gateway-name* software-datapath] hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Define tracing operations for exception handling.

**Options**

**file *filename***—Name of the file that receives the output of the tracing operation. All files are placed in the **/var/log** directory.

**files *files***— (Optional) Maximum number of trace files. When a trace file named **trace-file** reaches its maximum size, it is renamed **trace-file.0**, then **trace-file.1**, and so on, until the maximum number of trace files is reached. Then, the oldest trace file is overwritten.

If you specify a maximum number of files, you must also specify a maximum file size with the **size** option and a filename.

**Range:** 2 through 1000

**Default:** 3 files

**flag**

- *flag*—You can use one of the following flags:
  - **ager**—Trace flow ageout-related events.
  - **all**—Trace everything.
  - **buffering**—Trace buffering.
  - **commands**—Trace operational commands.
  - **configuration**—Trace configuration commands.
  - **flow**—Trace flow.

- **init**—Trace events related to the **init** datapath daemon .
- **ipv6-router-advertisement**—Trace IPv6 router advertisements.
- **memory**—Trace memory.
- **reassembly**—Trace reassembly.
- **redundancy**—Trace redundancy.

**level *level***—(Optional) Level of tracing to perform. You can specify any of the following levels:

- **all**—Match all levels.
- **error**—Match error conditions.
- **info**—Match informational messages.
- **notice**—Match conditions that should be handled specially.
- **verbose**—Match verbose messages.
- **warning**—Match warning messages.

**match *match***—(Optional) Refine the output to include lines that contain the regular expression.

**no-remote-trace**—(Optional) Disable remote tracing.

**no-world-readable**—(Optional) Restrict access to the originator of the trace operation only.

**size *size***—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). If you specify a maximum file size, you must also specify a maximum number of trace files with the **files** option and filename.

**Syntax:** **xk** to specify KB, **xm** to specify MB, or **xg** to specify GB

**Range:** 10 KB through 1 GB

**Default:** 128 KB

**world-readable**—(Optional) Enable unrestricted file access.

**Required Privilege Level**

trace and unified-edge—To view this statement in the configuration.
trace-control and unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Exception Handling Traceoptions on page 95
- software-datapath on page 989

CHAPTER 25

# Gateway Maintenance Mode Configuration Statement

## service-mode (GGSN or P-GW)

**Syntax** service-mode maintenance;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** This statement puts the respective gateway under maintenance mode.

When you have to make the following changes to the existing gateway configuration, you must put that gateway under maintenance mode:

- Deleting certain GTP interfaces, such as Gn, Gp, S5, and S8
- Changing the GTP interface address
- Deleting the gateway

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- ggsn-pgw on page 1061
- Mobility Maintenance Mode Overview on page 406

## service-mode (Serving Gateway)

**Syntax** service-mode *service-mode-options*;

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify that the Serving Gateway (S-GW) should be in **maintenance** mode. You do this if you want to perform maintenance tasks such as deleting certain GTP parameters or modifying the GTP interface address on the S-GW. See the *MobileNext Broadband Gateway Configuration Guide* for a list of maintenance tasks that you can perform when the S-GW is in maintenance mode.

When in the **Maintenance Mode Active Phase**, you can modify all valid attributes on the object. In all other cases, you can modify only the non-maintenance mode attributes.

**Options** ***service-mode-options***—Specify the service mode. Currently, only the **maintenance** mode is option supported.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- sgw on page 1073
- show unified-edge sgw service-mode on page 1408

CHAPTER 26

# GTP Configuration Statements

## control (GTP)

**Syntax**

```
control {
  ddn-delay-sync (disable | enable); #S-GW only
  dscp-code-point value;
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  forwarding-classclass-name;
  interface {
    interface-name;
    v4-addressv4-address;
  }
  n3-requests requests;
  no-response-cache;
  path-management (disable | enable);
  response-cache-timeoutt interval-in-seconds;
  t3-response response-interval;
  ttl-value ttl-value; #S-GW only
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *name* gtp],
[edit unified-edge gateways sgw *name* gtp]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* gtp]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

Configure the path and tunnel management parameters for the control plane. This configuration overrides the parameters configured at a higher hierarchy level.

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- gtp (GGSN or P-GW) on page 1014
- gtp (S-GW) on page 1019

## control (GTP Gn, Gp, S4, S5, and S8 Interfaces)

**Syntax**

```
control {
  dscp-code-point value;
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  forwarding-classclass-name;
  interface {
    interface-name;
    v4-addressv4-address;
  }
  n3-requests requests;
  path-management (disable | enable);
  support-16-bit-sequence; #P-GW: S5 and S8 only
  t3-response response-interval;
  ttl-value ttl-value; #S-GW: S4, S5, and S8 only
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *name* gtp gn],
[edit unified-edge gateways ggsn-pgw *name* gtp gp],
[edit unified-edge gateways ggsn-pgw *name* gtp s5],
[edit unified-edge gateways ggsn-pgw *name* gtp s8],
[edit unified-edge gateways sgw *name* gtp s4],
[edit unified-edge gateways sgw *name* gtp s5],
[edit unified-edge gateways sgw *name* gtp s8]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the following hierarchy levels introduced in Junos OS Mobility Release 11.4W:

- **[edit unified-edge gateways sgw *gateway-name* gtp s4]** hierarchy level
- **[edit unified-edge gateways sgw *gateway-name* gtp s5]** hierarchy level
- **[edit unified-edge gateways sgw *gateway-name* gtp s8]** hierarchy level

**Description**

Configure the path and tunnel management parameters for the control plane for the Gn, Gp, S4, S5, or S8 interfaces. This configuration overrides the parameters configured at a higher hierarchy level.

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- gn on page 1010
- gp on page 1012
- s4 on page 1037
- s5 on page 1039

- s8 on page 1041

## control (Peer Group)

**Syntax**

```
control {
  support-16-bit-sequence;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *name* gtp peer-group *peer-group*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure support for 16-bit sequence numbers for interoperation with older gateways that support a GTP version with a 16-bit sequence number length.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- peer-group (GTP) on page 1030

## data (GTP)

**Syntax**

```
data {
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  error-indication-interval seconds;
  indirect-tunnel (disable | enable); #S-GW only
  interface {
    interface-name;
    v4-addressv4-address;
  }
  num-gtpu-end-markers num-gtpu-end-markers; #S-GW only
  path-management (disable | enable);
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *name* gtp],
[edit unified-edge gateways sgw *name* gtp]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name* gtp]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

Configure the path and tunnel management parameters for the data plane. This configuration overrides the parameters configured at a higher hierarchy level.

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- gtp (GGSN or P-GW) on page 1014
- gtp (S-GW) on page 1019

## data (GTP Gn, Gp, S4, S5, and S8 Interfaces)

**Syntax**

```
data {
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  interface {
    interface-name;
    v4-addressv4-address;
  }
  n3-requests requests; #P-GW only
  path-management (disable | enable);
  t3-response response-interval; #P-GW only
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *name* gtp gn],
[edit unified-edge gateways ggsn-pgw *name* gtp gp],
[edit unified-edge gateways ggsn-pgw *name* gtp s5],
[edit unified-edge gateways ggsn-pgw *name* gtp s8],
[edit unified-edge gateways sgw *name* gtp s4],
[edit unified-edge gateways sgw *name* gtp s5],
[edit unified-edge gateways sgw *name* gtp s8]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the following hierarchy levels introduced in Junos OS Mobility Release 11.4W:

- **[edit unified-edge gateways sgw *gateway-name* gtp s4]** hierarchy level
- **[edit unified-edge gateways sgw *gateway-name* gtp s5]** hierarchy level
- **[edit unified-edge gateways sgw *gateway-name* gtp s8]** hierarchy level

**Description**

Configure the path and tunnel management parameters for the data plane for the Gn, Gp, S4, S5, or S8 interfaces. This configuration overrides the parameters configured at a higher hierarchy level.

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- gn on page 1010
- gp on page 1012
- s4 on page 1037
- s5 on page 1039
- s8 on page 1041

## ddn-delay-sync

**Syntax** ddn-delay-sync (disable | enable);

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name* gtp control]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify whether the synchronizing of the Downlink Data Notification (DDN) delay value with the other services PICs on the Serving Gateway should be disabled or enabled. DDN delay value synchronization is enabled by default.

**Options** **disable**—Disable DDN delay value synchronization.

**enable**—Enable DDN delay value synchronization.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring General GTP Service on the S-GW on page 257
- control (GTP) on page 995

## dscp-code-point (GTP)

**Syntax** dscp-code-point *value*;

**Hierarchy Level**
[edit unified-edge gateways ggsn-pgw *name* gtp control],
[edit unified-edge gateways ggsn-pgw *name* gtp gn control],
[edit unified-edge gateways ggsn-pgw *name* gtp gp control],
[edit unified-edge gateways ggsn-pgw *name* gtp s5 control],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 control],
[edit unified-edge gateways sgw *name* gtp control],
[edit unified-edge gateways sgw *name* gtp s11],
[edit unified-edge gateways sgw *name* gtp s4 control],
[edit unified-edge gateways sgw *name* gtp s5 control],
[edit unified-edge gateways sgw *name* gtp s8 control]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the following hierarchy levels introduced in Junos OS Mobility Release 11.4W:

- **[edit unified-edge gateways sgw *name* gtp control]**
- **[edit unified-edge gateways sgw *name* gtp s11]**
- **[edit unified-edge gateways sgw *name* gtp s4 control]**
- **[edit unified-edge gateways sgw *name* gtp s5 control]**
- **[edit unified-edge gateways sgw *name* gtp s8 control]**

**Description** Specify the value of the Differentiated Services (DiffServ) field within the IP header. DiffServ code point (DSCP) is used exclusively for GTP messages.

**Options** ***value***—DSCP value.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- **control (GTP) on page 995**

## echo-interval (GTP)

**Syntax** echo-interval *interval*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *name* gtp],
[edit unified-edge gateways ggsn-pgw *name* gtp control],
[edit unified-edge gateways ggsn-pgw *name* gtp data],
[edit unified-edge gateways ggsn-pgw *name* gtp gn],
[edit unified-edge gateways ggsn-pgw *name* gtp gn control],
[edit unified-edge gateways ggsn-pgw *name* gtp gn data],
[edit unified-edge gateways ggsn-pgw *name* gtp gp],
[edit unified-edge gateways ggsn-pgw *name* gtp gp control],
[edit unified-edge gateways ggsn-pgw *name* gtp gp data],
[edit unified-edge gateways ggsn-pgw *name* gtp peer-group *name*],
[edit unified-edge gateways ggsn-pgw *name* gtp s5],
[edit unified-edge gateways ggsn-pgw *name* gtp s5 control],
[edit unified-edge gateways ggsn-pgw *name* gtp s5 data],
[edit unified-edge gateways ggsn-pgw *name* gtp s8],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 control],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 data],
[edit unified-edge gateways sgw *name* gtp],
[edit unified-edge gateways sgw *name* gtp control],
[edit unified-edge gateways sgw *name* gtp data],
[edit unified-edge gateways sgw *name* gtp s11],
[edit unified-edge gateways sgw *name* gtp s12],
[edit unified-edge gateways sgw *name* gtp s1u],
[edit unified-edge gateways sgw *name* gtp s4],
[edit unified-edge gateways sgw *name* gtp s4 control],
[edit unified-edge gateways sgw *name* gtp s4 data],
[edit unified-edge gateways sgw *name* gtp s5],
[edit unified-edge gateways sgw *name* gtp s5 control],
[edit unified-edge gateways sgw *name* gtp s5 data],
[edit unified-edge gateways sgw *name* gtp s8],
[edit unified-edge gateways sgw *name* gtp s8 control],
[edit unified-edge gateways sgw *name* gtp s8 data]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the following hierarchy levels introduced in Junos OS Mobility Release 11.4W:

- **[edit unified-edge gateways sgw *name* gtp]**
- **[edit unified-edge gateways sgw *name* gtp control]**
- **[edit unified-edge gateways sgw *name* gtp data]**
- **[edit unified-edge gateways sgw *name* gtp s11]**
- **[edit unified-edge gateways sgw *name* gtp s12]**
- **[edit unified-edge gateways sgw *name* gtp s1u],**
- **[edit unified-edge gateways sgw *name* gtp s4]**
- **[edit unified-edge gateways sgw *name* gtp s4 control]**
- **[edit unified-edge gateways sgw *name* gtp s4 data]**

- **[edit unified-edge gateways sgw *name* gtp s5]**
- **[edit unified-edge gateways sgw *name* gtp s5 control]**
- **[edit unified-edge gateways sgw *name* gtp s5 data]**
- **[edit unified-edge gateways sgw *name* gtp s8]**
- **[edit unified-edge gateways sgw *name* gtp s8 control]**
- **[edit unified-edge gateways sgw *name* gtp s8 data]**

**Description** Configure the echo request interval for path management.

- For the Gateway GPRS Support Node (GGSN) or Packet Data Network Gateway (P-GW), the echo request interval is the number of seconds that the GGSN or P-GW waits before sending an echo request message to its peer (SGSN or S-GW).
- For the Serving Gateway (S-GW), the echo request interval is the number of seconds that the S-GW waits before sending an echo request message to its peer (MME, S4-SGSN, or P-GW).

This interval applies to both GTP-C and GTP-U echo messages.

**Options** *interval*—Echo request interval, in seconds.

**Range:** 60 through 65535 seconds.

**Default:** 60 seconds.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- GTP Path Management Overview on page 224
- **gtp (GGSN or P-GW) on page 1014**
- **gtp (S-GW) on page 1019**

## echo-n3-requests

**Syntax** echo-n3-requests *requests*;

**Hierarchy Level**
[edit unified-edge gateways ggsn-pgw *name* gtp],
[edit unified-edge gateways ggsn-pgw *name* gtp control],
[edit unified-edge gateways ggsn-pgw *name* gtp data],
[edit unified-edge gateways ggsn-pgw *name* gtp gn],
[edit unified-edge gateways ggsn-pgw *name* gtp gn control],
[edit unified-edge gateways ggsn-pgw *name* gtp gn data],
[edit unified-edge gateways ggsn-pgw *name* gtp gp],
[edit unified-edge gateways ggsn-pgw *name* gtp gp control],
[edit unified-edge gateways ggsn-pgw *name* gtp gp data],
[edit unified-edge gateways ggsn-pgw *name* gtp peer-group *name*],
[edit unified-edge gateways ggsn-pgw *name* gtp s5],
[edit unified-edge gateways ggsn-pgw *name* gtp s5 control],
[edit unified-edge gateways ggsn-pgw *name* gtp s5 data],
[edit unified-edge gateways ggsn-pgw *name* gtp s8],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 control],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 data],
[edit unified-edge gateways sgw *name* gtp],
[edit unified-edge gateways sgw *name* gtp control],
[edit unified-edge gateways sgw *name* gtp data],
[edit unified-edge gateways sgw *name* gtp s11],
[edit unified-edge gateways sgw *name* gtp s12],
[edit unified-edge gateways sgw *name* gtp s1u],
[edit unified-edge gateways sgw *name* gtp s4],
[edit unified-edge gateways sgw *name* gtp s4 control],
[edit unified-edge gateways sgw *name* gtp s4 data],
[edit unified-edge gateways sgw *name* gtp s5],
[edit unified-edge gateways sgw *name* gtp s5 control],
[edit unified-edge gateways sgw *name* gtp s5 data],
[edit unified-edge gateways sgw *name* gtp s8],
[edit unified-edge gateways sgw *name* gtp s8 control],
[edit unified-edge gateways sgw *name* gtp s8 data]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the following hierarchy levels introduced in Junos OS Mobility Release 11.4W:

- **[edit unified-edge gateways sgw *name* gtp]**
- **[edit unified-edge gateways sgw *name* gtp control]**
- **[edit unified-edge gateways sgw *name* gtp data]**
- **[edit unified-edge gateways sgw *name* gtp s11]**
- **[edit unified-edge gateways sgw *name* gtp s12]**
- **[edit unified-edge gateways sgw *name* gtp s1u]**
- **[edit unified-edge gateways sgw *name* gtp s4]**
- **[edit unified-edge gateways sgw *name* gtp s4 control]**
- **[edit unified-edge gateways sgw *name* gtp s4 data]**

- [edit unified-edge gateways sgw *name* gtp s5]
- [edit unified-edge gateways sgw *name* gtp s5 control]
- [edit unified-edge gateways sgw *name* gtp s5 data]
- [edit unified-edge gateways sgw *name* gtp s8]
- [edit unified-edge gateways sgw *name* gtp s8 control]
- [edit unified-edge gateways sgw *name* gtp s8 data]

**Description** Configure the maximum number of retries of GTP echo request messages for path management. Echo request messages are resent only when there is no response to the transmitted echo request messages within the configured response timeout value (for GTP echo request messages).

**Options** ***requests***—Maximum number of times that the broadband gateway attempts to send an echo request message.

**Range:** 1 through 8

**Default:** 8

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- gtp (GGSN or P-GW) on page 1014
- gtp (S-GW) on page 1019

## echo-t3-response

**Syntax** echo-t3-response *response-interval*;

**Hierarchy Level**
[edit unified-edge gateways ggsn-pgw *name* gtp],
[edit unified-edge gateways ggsn-pgw *name* gtp control],
[edit unified-edge gateways ggsn-pgw *name* gtp data],
[edit unified-edge gateways ggsn-pgw *name* gtp gn],
[edit unified-edge gateways ggsn-pgw *name* gtp gn control],
[edit unified-edge gateways ggsn-pgw *name* gtp gn data],
[edit unified-edge gateways ggsn-pgw *name* gtp gp],
[edit unified-edge gateways ggsn-pgw *name* gtp gp control],
[edit unified-edge gateways ggsn-pgw *name* gtp gp data],
[edit unified-edge gateways ggsn-pgw *name* gtp peer-group *name*],
[edit unified-edge gateways ggsn-pgw *name* gtp s5],
[edit unified-edge gateways ggsn-pgw *name* gtp s5 control],
[edit unified-edge gateways ggsn-pgw *name* gtp s5 data],
[edit unified-edge gateways ggsn-pgw *name* gtp s8],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 control],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 data],
[edit unified-edge gateways sgw *name* gtp],
[edit unified-edge gateways sgw *name* gtp control],
[edit unified-edge gateways sgw *name* gtp data],
[edit unified-edge gateways sgw *name* gtp s11],
[edit unified-edge gateways sgw *name* gtp s12],
[edit unified-edge gateways sgw *name* gtp s1u],
[edit unified-edge gateways sgw *name* gtp s4],
[edit unified-edge gateways sgw *name* gtp s4 control],
[edit unified-edge gateways sgw *name* gtp s4 data],
[edit unified-edge gateways sgw *name* gtp s5],
[edit unified-edge gateways sgw *name* gtp s5 control],
[edit unified-edge gateways sgw *name* gtp s5 data],
[edit unified-edge gateways sgw *name* gtp s8],
[edit unified-edge gateways sgw *name* gtp s8 control],
[edit unified-edge gateways sgw *name* gtp s8 data]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the following hierarchy levels introduced in Junos OS Mobility Release 11.4W:

- **[edit unified-edge gateways sgw *name* gtp]**
- **[edit unified-edge gateways sgw *name* gtp control],**
- **[edit unified-edge gateways sgw *name* gtp data]**
- **[edit unified-edge gateways sgw *name* gtp s11]**
- **[edit unified-edge gateways sgw *name* gtp s12]**
- **[edit unified-edge gateways sgw *name* gtp s1u]**
- **[edit unified-edge gateways sgw *name* gtp s4]**
- **[edit unified-edge gateways sgw *name* gtp s4 control]**
- **[edit unified-edge gateways sgw *name* gtp s4 data]**

- **[edit unified-edge gateways sgw *name* gtp s5]**
- **[edit unified-edge gateways sgw *name* gtp s5 control]**
- **[edit unified-edge gateways sgw *name* gtp s5 data]**
- **[edit unified-edge gateways sgw *name* gtp s8]**
- **[edit unified-edge gateways sgw *name* gtp s8 control]**
- **[edit unified-edge gateways sgw *name* gtp s8 data]**

**Description** Configure the response timeout for a GTP echo request message. The response timeout indicates the time (in seconds) that the broadband gateway waits before transmitting the next echo request message if it does not receive a response.

**Default** If you do not include this statement, the response timeout is set to 5 seconds.

**Options** ***response interval***—Time, in seconds, that the gateway waits before transmitting the next echo request message if it does not receive a response.

**Range:** 1 through 30 seconds

**Default:** 15 seconds

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- gtp (GGSN or P-GW) on page 1014
- gtp (S-GW) on page 1019

## error-indication-interval

**Syntax** error-indication-interval *seconds*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *name* gtp data],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 data],
[edit unified-edge gateways sgw *name* gtp data],
[edit unified-edge gateways sgw *name* gtp s8 data]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the interval at which the broadband gateway generates an error indication (Tunnel Endpoint Identifier [TEID] error message) to the peer per bearer. One error indication is generated per bearer for the interval configured, in seconds.

**Options** ***seconds***— Number of seconds that the gateway waits before indicating an error message to the peer.

**Range:** 1 through 20 seconds

**Default:** 2 seconds

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- gtp (GGSN or P-GW) on page 1014
- gtp (S-GW) on page 1019

## forwarding-class (GTP)

**Syntax** forwarding-class *class-name*;

**Hierarchy Level**
[edit unified-edge gateways ggsn-pgw *name* gtp control],
[edit unified-edge gateways ggsn-pgw *name* gtp gn control],
[edit unified-edge gateways ggsn-pgw *name* gtp gp control],
[edit unified-edge gateways ggsn-pgw *name* gtp s5 control],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 control],
[edit unified-edge gateways sgw *name* gtp control],
[edit unified-edge gateways sgw *name* gtp s4 control],
[edit unified-edge gateways sgw *name* gtp s5 control],
[edit unified-edge gateways sgw *name* gtp s8 control],
[edit unified-edge gateways sgw *name* gtp s11]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the following hierarchy levels introduced in Junos OS Mobility Release 11.4W:

- **[edit unified-edge gateways sgw *name* gtp control]**
- **[edit unified-edge gateways sgw *name* gtp s4 control]**
- **[edit unified-edge gateways sgw *name* gtp s5 control]**
- **[edit unified-edge gateways sgw *name* gtp s8 control]**
- **[edit unified-edge gateways sgw *name* gtp s11]**

**Description** Specify a forwarding class for outbound control packets.

**Options** ***class-name***—Name of the forwarding class.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- control (GTP) on page 995
- control (GTP Gn, Gp, S4, S5, and S8 Interfaces) on page 996
- s11 on page 1034

## gn

**Syntax**

```
gn {
  control {
    dscp-code-point value;
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    forwarding-classclass-name;
    interface {
      interface-name;
      v4-address v4-address;
    }
    n3-requests requests;
    path-management (disable | enable);
    t3-response response-interval;
  }
  data {
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    interface {
      interface-name;
      v4-address v4-address;
    }
    n3-requests requests;
    path-management (disable | enable);
    t3-response response-interval;
  }
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  interface {
    interface-name;
    v4-address v4-address;
  }
  n3-requests requests;
  path-management (disable | enable);
  t3-response response-interval;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *name* gtp]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the path and tunnel management parameters for the 3GPP Gn interface. This configuration overrides the parameters configured at a higher level in the hierarchy and applies to all GTP peers that connect to the Gn interface. You can also configure parameters only for GTP control packets or GTP user plane packets—these parameters override the parameters at the higher hierarchy levels.

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- gtp (GGSN or P-GW) on page 1014

## gp

**Syntax**

```
gp {
  control {
    dscp-code-point value;
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    forwarding-classclass-name;
    interface {
      interface-name;
      v4-address v4-address;
    }
    n3-requests requests;
    path-management (disable | enable);
    t3-response response-interval;
  }
  data {
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    interface {
      interface-name;
      v4-address v4-address;
    }
    n3-requests requests;
    path-management (disable | enable);
    t3-response response-interval;
  }
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  interface {
    interface-name;
    v4-address v4-address;
  }
  n3-requests requests;
  path-management (disable | enable);
  t3-response response-interval;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *name* gtp]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the path and tunnel management parameters for the 3GPP Gp interface. This configuration overrides the parameters configured at a higher level in the hierarchy and applies to all GTP peers that connect to the Gp interface. You can also configure parameters only for GTP control packets or GTP user plane packets—these parameters override the parameters at the higher hierarchy levels.

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- gtp (GGSN or P-GW) on page 1014

## gtp (GGSN or P-GW)

**Syntax**

```
gtp {
  control {
    dscp-code-point value;
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    forwarding-classclass-name;
    interface {
      interface-name;
      v4-address v4-address;
    }
    n3-requests requests;
    no-response-cache;
    path-management (disable | enable);
    response-cache-timeoutt interval-in-seconds;
    t3-response response-interval;
  }
  data {
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    error-indication-interval seconds;
    interface {
      interface-name;
      v4-address v4-address;
    }
    path-management (disable | enable);
  }
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  gn {
    control {
      dscp-code-point value;
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      forwarding-classclass-name;
      interface {
        interface-name;
        v4-address v4-address;
      }
      n3-requests requests;
      path-management (disable | enable);
      t3-response response-interval;
    }
    data {
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      interface {
        interface-name;
```

```
        v4-address v4-address;
      }
      n3-requests requests;
      path-management (disable | enable);
      t3-response response-interval;
    }
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    interface {
      interface-name;
      v4-address v4-address;
    }
    n3-requests requests;
    path-management (disable | enable);
    t3-response response-interval;
  }
  gp {
    control {
      dscp-code-point value;
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      forwarding-classclass-name;
      interface {
        interface-name;
        v4-address v4-address;
      }
      n3-requests requests;
      path-management (disable | enable);
      t3-response response-interval;
    }
    data {
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      interface {
        interface-name;
        v4-address v4-address;
      }
      n3-requests requests;
      path-management (disable | enable);
      t3-response response-interval;
    }
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    interface {
      interface-name;
      v4-address v4-address;
    }
    n3-requests requests;
    path-management (disable | enable);
    t3-response response-interval;
  }
  interface {
```

```
    interface-name;
    v4-address v4-address;
  }
  n3-requests requests;
  path-management (disable | enable);
  peer-group name {
    control {
      support-16-bit-sequence;
    }
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    n3-requests requests;
    path-management (disable | enable);
    peer {
      [ip-addr-prefix];
    }
    routing-instance routing-identifier;
    t3-response response-interval;
  }
  peer-history number;
  s5 {
    control {
      dscp-code-point value;
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      forwarding-classclass-name;
      interface {
        interface-name;
        v4-address v4-address;
      }
      n3-requests requests;
      path-management (disable | enable);
      support-16-bit-sequence;
      t3-response response-interval;
    }
    data {
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      interface {
        interface-name;
        v4-address v4-address;
      }
      n3-requests requests;
      path-management (disable | enable);
      t3-response response-interval;
    }
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    interface {
      interface-name;
      v4-address v4-address;
    }
```

```
    n3-requests requests;
    path-management (disable | enable);
    t3-response response-interval;
  }
  s8 {
    control {
      dscp-code-point value;
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      forwarding-classclass-name;
      interface {
        interface-name;
        v4-address v4-address;
      }
      n3-requests requests;
      path-management (disable | enable);
      support-16-bit-sequence;
      t3-response response-interval;
    }
    data {
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      interface {
        interface-name;
        v4-address v4-address;
      }
      n3-requests requests;
      path-management (disable | enable);
      t3-response response-interval;
    }
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    interface {
      interface-name;
      v4-address v4-address;
    }
    n3-requests requests;
    path-management (disable | enable);
    t3-response response-interval;
  }
  t3-response response-interval;
  traceoptions {
    file filename {
      files files;
      (no-world-readable | world-readable);
      size size;
    }
    flag {
      flag;
    }
    level level;
    no-remote-trace;
  }
```

```
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the parameters related to the GPRS tunneling protocol (GTP) on the Gateway GPRS Support Node (GGSN) or Packet Data Network Gateway (P-GW). GTP is used to tunnel GTP packets through 3G and 4G networks. GTP is the primary protocol used in a GPRS core network and allows users in a 3G or 4G network to move from one location to another while remaining connected to the Internet. A MobileNext Broadband Gateway configured as a GGSN, P-GW, or GGSN/P-GW automatically selects the appropriate GTP version based on the capabilities of the Serving GPRS Support Node (SGSN) or Serving Gateway (S-GW) to which it is connected.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- [edit unified-edge gateways ggsn-pgw <gateway-name>] Hierarchy Level on page 604
- Configuring GTP Services Overview on page 234

## gtp (S-GW)

**Syntax**

```
gtp {
  control {
    ddn-delay-sync (disable | enable);
    dscp-code-point value;
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    forwarding-classclass-name;
    interface {
      interface-name;
      v4-addressv4-address;
    }
    n3-requests requests;
    no-response-cache;
    path-management (disable | enable);
    response-cache-timeoutt interval-in-seconds;
    t3-response response-interval;
    ttl-value ttl-value;
  }
  data {
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    error-indication-interval seconds;
    indirect-tunnel (disable | enable);
    interface {
      interface-name;
      v4-addressv4-address;
    }
    num-gtpu-end-markers num-gtpu-end-markers;
    path-management (disable | enable);
  }
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  interface {
    interface-name;
    v4-addressv4-address;
  }
  n3-requests requests;
  path-management (disable | enable);
  peer-history number;
  s11 {
    dscp-code-point value;
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    forwarding-classclass-name;
    interface {
      interface-name;
      v4-addressv4-address;
    }
```

```
    n3-requests requests;
    path-management (disable | enable);
    t3-response response-interval;
    ttl-value ttl-value;
  }
  s12 {
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    interface {
      interface-name;
      v4-addressv4-address;
    }
    path-management (disable | enable);
  }
  s1u {
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    interface {
      interface-name;
      v4-addressv4-address;
    }
    path-management (disable | enable);
  }
  s4 {
    control {
      dscp-code-point value;
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      forwarding-classclass-name;
      interface {
        interface-name;
        v4-addressv4-address;
      }
      n3-requests requests;
      path-management (disable | enable);
      t3-response response-interval;
      ttl-value ttl-value;
    }
    data {
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      interface {
        interface-name;
        v4-addressv4-address;
      }
      path-management (disable | enable);
    }
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    interface {
      interface-name;
```

```
        v4-address v4-address;
      }
      n3-requests requests;
      path-management (disable | enable);
      t3-response response-interval;
    }
    s5 {
      control {
        dscp-code-point value;
        echo-interval interval;
        echo-n3-requests requests;
        echo-t3-response response-interval;
        forwarding-class class-name;
        interface {
          interface-name;
          v4-address v4-address;
        }
        n3-requests requests;
        path-management (disable | enable);
        t3-response response-interval;
        ttl-value ttl-value;
      }
      data {
        echo-interval interval;
        echo-n3-requests requests;
        echo-t3-response response-interval;
        interface {
          interface-name;
          v4-address v4-address;
        }
        path-management (disable | enable);
      }
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      interface {
        interface-name;
        v4-address v4-address;
      }
      n3-requests requests;
      path-management (disable | enable);
      t3-response response-interval;
    }
    s8 {
      control {
        dscp-code-point value;
        echo-interval interval;
        echo-n3-requests requests;
        echo-t3-response response-interval;
        forwarding-class class-name;
        interface {
          interface-name;
          v4-address v4-address;
        }
        n3-requests requests;
        path-management (disable | enable);
```

```
        t3-response response-interval;
        ttl-value ttl-value;
      }
      data {
        echo-interval interval;
        echo-n3-requests requests;
        echo-t3-response response-interval;
        interface {
          interface-name;
          v4-addressv4-address;
        }
        path-management (disable | enable);
      }
      echo-interval interval;
      echo-n3-requests requests;
      echo-t3-response response-interval;
      interface {
        interface-name;
        v4-addressv4-address;
      }
      n3-requests requests;
      path-management (disable | enable);
      t3-response response-interval;
    }
    t3-response response-interval;
    traceoptions {
      file filename {
        files files;
        (no-world-readable | world-readable);
        size size;
      }
      flag {
        flag;
      }
      level level;
      no-remote-trace;
    }
}
```

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the parameters related to the GPRS tunneling protocol (GTP) on the Serving Gateway (S-GW). GTP is used to tunnel GTP packets through 3G and 4G networks. Only GTP Version 2 is supported on the S-GW.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- [edit unified-edge gateways sgw <gateway-name>] Hierarchy Level on page 615
- Configuring General GTP Service on the S-GW on page 257

## indirect-tunnel

**Syntax** indirect-tunnel (disable | enable);

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name* gtp data]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify whether support for indirect tunnel forwarding should be disabled or enabled. Indirect tunnel forwarding is enabled by default.

To ensure minimal packet loss, network elements must switch the packet forwarding path from source eNodeB to target eNodeB, or, in inter-RAT scenarios, between eNodeB to Serving GPRS Support Node (SGSN) or Radio Network Controller (RNC), or SGSN to eNodeB.

If a direct path is available, then the packets are routed directly between the network elements. If a direct path between the network elements is not available, then the packets are routed indirectly from the source eNodeB, RNC, or SGSN to the target eNodeB, RNC, or SGSN via the Serving Gateway (S-GW), or the source and target S-GWs (in the case of S-GW relocation). Indirect tunnels might be set up in the S-GW that is not hosting subscriber sessions.

**Options** **disable**—Disable support for indirect tunnel forwarding.

**enable**—Enable support for indirect tunnel forwarding.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring General GTP Service on the S-GW on page 257
- gtp (S-GW) on page 1019

## interface (GTP)

**Syntax**

```
interface {
  interface-name;
  v4-address v4-address;
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *name* gtp],
[edit unified-edge gateways ggsn-pgw *name* gtp control],
[edit unified-edge gateways ggsn-pgw *name* gtp data],
[edit unified-edge gateways ggsn-pgw *name* gtp gn],
[edit unified-edge gateways ggsn-pgw *name* gtp gn control],
[edit unified-edge gateways ggsn-pgw *name* gtp gn data],
[edit unified-edge gateways ggsn-pgw *name* gtp gp],
[edit unified-edge gateways ggsn-pgw *name* gtp gp control],
[edit unified-edge gateways ggsn-pgw *name* gtp gp data],
[edit unified-edge gateways ggsn-pgw *name* gtp s5],
[edit unified-edge gateways ggsn-pgw *name* gtp s5 control],
[edit unified-edge gateways ggsn-pgw *name* gtp s5 data],
[edit unified-edge gateways ggsn-pgw *name* gtp s8],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 control],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 data],
[edit unified-edge gateways sgw *name* gtp],
[edit unified-edge gateways sgw *name* gtp control],
[edit unified-edge gateways sgw *name* gtp data],
[edit unified-edge gateways sgw *name* gtp s11],
[edit unified-edge gateways sgw *name* gtp s12],
[edit unified-edge gateways sgw *name* gtp s1u],
[edit unified-edge gateways sgw *name* gtp s4],
[edit unified-edge gateways sgw *name* gtp s4 control],
[edit unified-edge gateways sgw *name* gtp s4 data],
[edit unified-edge gateways sgw *name* gtp s5],
[edit unified-edge gateways sgw *name* gtp s5 control],
[edit unified-edge gateways sgw *name* gtp s5 data],
[edit unified-edge gateways sgw *name* gtp s8],
[edit unified-edge gateways sgw *name* gtp s8 control],
[edit unified-edge gateways sgw *name* gtp s8 data]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the following hierarchy levels introduced in Junos OS Mobility Release 11.4W:

- **[edit unified-edge gateways sgw *name* gtp]**
- **[edit unified-edge gateways sgw *name* gtp control]**
- **[edit unified-edge gateways sgw *name* gtp data]**
- **[edit unified-edge gateways sgw *name* gtp s11]**
- **[edit unified-edge gateways sgw *name* gtp s12]**
- **[edit unified-edge gateways sgw *name* gtp s1u]**
- **[edit unified-edge gateways sgw *name* gtp s4]**
- **[edit unified-edge gateways sgw *name* gtp s4 control]**

- **[edit unified-edge gateways sgw *name* gtp s4 data]**
- **[edit unified-edge gateways sgw *name* gtp s5]**
- **[edit unified-edge gateways sgw *name* gtp s5 control]**
- **[edit unified-edge gateways sgw *name* gtp s5 data]**
- **[edit unified-edge gateways sgw *name* gtp s8]**
- **[edit unified-edge gateways sgw *name* gtp s8 control]**
- **[edit unified-edge gateways sgw *name* gtp s8 data]**

**Description** Specify the loopback interface and IPv4 address on which the GTP packets are received. To enable GTP services, you must configure at least one loopback interface and IPv4 address for the Gateway GPRS Support Node (GGSN) or Packet Data Network Gateway (P-GW) or for the Serving Gateway (S-GW), as applicable.

For the GGSN or P-GW, you can optionally configure the loopback interface and IP address at the Gn, Gp, S5, or S8 interface levels or their corresponding control and data planes, or at the gateway level or their corresponding control and data planes.

For the S-GW, you can optionally configure the loopback interface and IP address at the S11, S12, or S1u interface levels, or the S4, S5, or S8 interface levels, or their corresponding control and data planes, or at the gateway level or their corresponding control and data planes. However, you must at least configure the **interface** statement:

- At the **[edit unified-edge gateways sgw *name* gtp]** hierarchy level or the **[edit unified-edge gateways sgw *name* gtp control]** and **[edit unified-edge gateways sgw *name* gtp data]** hierarchy levels, or
- If it is not configured at the top of the GTP hierarchy level, you must configure the statement for either:
  - The S11, S1u, and one of the S5 or S8 interfaces, or
  - The S4, and one of the S5 or S8 interfaces.

**Options** ***interface-name***—Name of the interface used in the gateway.

**v4-address *v4-address***—IP address (IPv4) on which the GTP packets are received.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Configuring GTP Services Overview on page 234
- gtp (GGSN or P-GW) on page 1014
- gtp (S-GW) on page 1019

## n3-requests

**Syntax** n3-requests *requests*;

**Hierarchy Level**
[edit unified-edge gateways ggsn-pgw *name* gtp control],
[edit unified-edge gateways ggsn-pgw *name* gtp gn control],
[edit unified-edge gateways ggsn-pgw *name* gtp gp control],
[edit unified-edge gateways ggsn-pgw *name* gtp s5 control],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 control],
[edit unified-edge gateways sgw *name* gtp control],
[edit unified-edge gateways sgw *name* gtp s11],
[edit unified-edge gateways sgw *name* gtp s4 control],
[edit unified-edge gateways ggsn-pgw *name* gtp s5 control],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 control],

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the following hierarchy levels introduced in Junos OS Mobility Release 11.4W:

- **[edit unified-edge gateways sgw *name* gtp control]**
- **[edit unified-edge gateways sgw *name* gtp s5 control]**
- **[edit unified-edge gateways sgw *name* gtp s8 control]**

**Description** For tunnel management, configure the maximum number of times that the broadband gateway attempts to send a signaling request message to a control. The gateway waits for the time specified in the **t3-timeout** statement before resending a signaling request message when a response to the request has not been received.

**Options** ***requests***—Maximum number of times that the gateway attempts to send a signaling request message.

**Range:** 1 through 5

**Default:** 3

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- gtp (GGSN or P-GW) on page 1014
- gtp (S-GW) on page 1019

## no-response-cache

**Syntax** no-response-cache;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* gtp control],
[edit unified-edge gateways sgw *gateway-name* gtp control]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify that the GPRS Tunneling Protocol (GTP) response cache is disabled. The response cache stores the GTP responses (sent for request messages) for the duration configured, or the default, if the time is not configured, using the **response-cache-timeout** statement. If this cache is disabled, then the response messages are not stored.

**Default** If you do not configure this statement, then the GTP response cache is enabled by default.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring General GTP Service on the S-GW on page 257
- gtp (GGSN or P-GW) on page 1014
- gtp (S-GW) on page 1019
- response-cache-timeout on page 1032

## num-gtpu-end-markers

**Syntax** num-gtpu-end-markers *num-gtpu-end-markers*;

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name* gtp data]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the number of GPRS tunneling protocol, user plane (GTP-U) end marker packets to be sent in case of handovers towards the previous access tunnel for the bearer.

**Options** *num-gtpu-end-markers*—Number of GTP-U end marker packets.
**Range:** 1 through 10.
**Default:** 1

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring General GTP Service on the S-GW on page 257
- gtp (S-GW) on page 1019

## path-management

**Syntax** path-management (disable | enable);

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *name* gtp],
[edit unified-edge gateways ggsn-pgw *name* gtp control],
[edit unified-edge gateways ggsn-pgw *name* gtp data],
[edit unified-edge gateways ggsn-pgw *name* gtp gn],
[edit unified-edge gateways ggsn-pgw *name* gtp gn control],
[edit unified-edge gateways ggsn-pgw *name* gtp gn data],
[edit unified-edge gateways ggsn-pgw *name* gtp gp],
[edit unified-edge gateways ggsn-pgw *name* gtp gp control],
[edit unified-edge gateways ggsn-pgw *name* gtp gp data],
[edit unified-edge gateways ggsn-pgw *name* gtp peer-group *name*],
[edit unified-edge gateways ggsn-pgw *name* gtp s5],
[edit unified-edge gateways ggsn-pgw *name* gtp s5 control],
[edit unified-edge gateways ggsn-pgw *name* gtp s5 data],
[edit unified-edge gateways ggsn-pgw *name* gtp s8],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 control],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 data],
[edit unified-edge gateways sgw *name* gtp],
[edit unified-edge gateways sgw *name* gtp control],
[edit unified-edge gateways sgw *name* gtp data],
[edit unified-edge gateways sgw *name* gtp s11],
[edit unified-edge gateways sgw *name* gtp s12],
[edit unified-edge gateways sgw *name* gtp s1u],
[edit unified-edge gateways sgw *name* gtp s4],
[edit unified-edge gateways sgw *name* gtp s4 control],
[edit unified-edge gateways sgw *name* gtp s4 data],
[edit unified-edge gateways ggsn-pgw *name* gtp s5],
[edit unified-edge gateways ggsn-pgw *name* gtp s5 control],
[edit unified-edge gateways sgw *name* gtp s5 data],
[edit unified-edge gateways ggsn-pgw *name* gtp s8],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 control],
[edit unified-edge gateways sgw *name* gtp s8 data]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the following hierarchy levels introduced in Junos OS Mobility Release 11.4W:

- **[edit unified-edge gateways sgw *name* gtp]**
- **[edit unified-edge gateways sgw *name* gtp control]**
- **[edit unified-edge gateways sgw *name* gtp data]**
- **[edit unified-edge gateways sgw *name* gtp s11]**
- **[edit unified-edge gateways sgw *name* gtp s12]**
- **[edit unified-edge gateways sgw *name* gtp s1u]**
- **[edit unified-edge gateways sgw *name* gtp s4]**
- **[edit unified-edge gateways sgw *name* gtp s4 control]**
- **[edit unified-edge gateways sgw *name* gtp s4 data]**

- [edit unified-edge gateways sgw *name* gtp s5]
- [edit unified-edge gateways sgw *name* gtp s5 control]
- [edit unified-edge gateways sgw *name* gtp s5 data]
- [edit unified-edge gateways sgw *name* gtp s8]
- [edit unified-edge gateways sgw *name* gtp s8 control]
- [edit unified-edge gateways sgw *name* gtp s8 data]

**Description** Enable or disable path management. When path management is disabled, the broadband gateway does not send echo request messages to its peer.

By default, path management is enabled only on the control plane for the broadband gateway.

**Options** **disable**—Disable path management.

**enable**—Enable path management.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Configuring GTP Services Overview on page 234
- gtp (GGSN or P-GW) on page 1014
- gtp (S-GW) on page 1019

## peer (GTP)

**Syntax**
```
peer {
  [ip-addr-prefix];
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *name* gtp peer-group *peer-group*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the IP address of the peer in the peer group. The IP address specified must also include the network prefix. To specify multiple peers, include the **peer** statement multiple times.

**Options** ***ip-addr-prefix***—IP address of the peer, including the network prefix; for example, 22.1.1.10/16.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Configuring GTP Services Overview on page 234
- peer-group (GTP) on page 1030

## peer-group (GTP)

**Syntax**

```
peer-group name {
  control {
    support-16-bit-sequence;
  }
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  n3-requests requests;
  path-management (disable | enable);
  peer {
    [ip-addr-prefix];
  }
  routing-instance routing-identifier;
  t3-response response-interval;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *name* gtp]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure a group of 3GPP GTP peers to share common signaling and data parameters. This configuration overrides the common or interface-specific configuration for the peers in the group.

**Options** *name*—Name of the peer group.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- gtp (GGSN or P-GW) on page 1014

## peer-history (GTP)

**Syntax** peer-history *number*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *name* gtp],
[edit unified-edge gateways sgw *name* gtp]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *name* gtp]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the maximum number of peers (that are no longer present on the broadband gateway) for which the broadband gateway stores the statistics collected.

**Options** ***number***—Maximum number of peers for which statistics are stored.

**Range:** 1 through 1000

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- gtp (GGSN or P-GW) on page 1014
- gtp (S-GW) on page 1019

## response-cache-timeout

**Syntax** response-cache-timeout *interval-in-seconds*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* gtp control],
[edit unified-edge gateways sgw *gateway-name* gtp control]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the timeout for the GPRS Tunneling Protocol (GTP) response cache. This timeout indicates the duration for which the GTP response messages (sent for request messages) should be stored in the response cache.

NOTE: This configuration is invalid if the **no-response-cache** statement is configured.

**Options** ***timeout-in-seconds***—Timeout, in seconds, for the GTP response cache.

**Range:** 5 through 20 seconds

**Default:** 15 seconds

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring General GTP Service on the S-GW on page 257
- gtp (GGSN or P-GW) on page 1014
- gtp (S-GW) on page 1019
- no-response-cache on page 1027

## routing-instance (GTP)

**Syntax** routing-instance *routing-identifier*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *name* gtp peer-group *name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the routing instance or the VPN routing and forwarding (VRF) instance for the peer group.

**Options** ***routing-identifier***—Identifier for the routing instance.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- peer-group (GTP) on page 1030

## s11

**Syntax**

```
s11 {
  dscp-code-point value;
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  forwarding-classclass-name;
  interface {
    interface-name;
    v4-addressv4-address;
  }
  n3-requests requests;
  path-management (disable | enable);
  t3-response response-interval;
  ttl-value ttl-value;
}
```

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name* gtp]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the 3GPP control parameters applicable to the 3GPP s11 interface. The s11 interface is used by the serving gateway and the Mobile Management Entity (MME) to exchange GTP-C control packets with each other.

The values configured here override the common control configuration configured at the **[edit unified-edge gateways sgw *gateway-name* gtp]** hierarchy level. The parameters configured here are applicable to all GTP peers that use the interface.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP-C Services on the S11 Interface on page 260
- gtp (S-GW) on page 1019

## s12

**Syntax**

```
s12 {
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  interface {
    interface-name;
    v4-addressv4-address;
  }
  path-management (disable | enable);
}
```

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name* gtp]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the 3GPP data parameters applicable to the 3GPP s12 interface. The s12 interface is used by the serving gateway and the Radio Network Controller (RNC) to exchange GTP user plane (GTP-U) data packets with each other.

The values configured here override the common data configuration configured at the **[edit unified-edge gateways sgw *gateway-name* gtp]** hierarchy level. The parameters configured here are applicable to all GTP peers that use the interface.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP-U Services on the S12 Interface on page 262
- gtp (S-GW) on page 1019

## s1u

**Syntax**

```
s1u {
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  interface {
    interface-name;
    v4-addressv4-address;
  }
  path-management (disable | enable);
}
```

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name* gtp]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the 3GPP data parameters applicable to the 3GPP s1u interface. The s1u interface is used by the serving gateway and the eNodeB to exchange GTP user plane (GTP-U) data packets with each other.

The values configured here override the common data configuration configured at the **[edit unified-edge gateways sgw *gateway-name* gtp]** hierarchy level. The parameters configured here are applicable to all GTP peers that use the interface.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services on the S1-U Interface on page 264
- gtp (S-GW) on page 1019

## s4

**Syntax**

```
s4 {
  control {
    dscp-code-point value;
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    forwarding-classclass-name;
    interface {
      interface-name;
      v4-addressv4-address;
    }
    n3-requests requests;
    path-management (disable | enable);
    t3-response response-interval;
    ttl-value ttl-value;
  }
  data {
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    interface {
      interface-name;
      v4-addressv4-address;
    }
    path-management (disable | enable);
  }
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  interface {
    interface-name;
    v4-addressv4-address;
  }
  n3-requests requests;
  path-management (disable | enable);
  t3-response response-interval;
}
```

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name* gtp]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the 3GPP control and data parameters applicable to the 3GPP S4 interface. The S4 interface is used by the serving gateway and the S4 Serving GPRS Support Nodes (SGSNs).

The values configured here override the common control and data configuration configured at the **[edit unified-edge gateways sgw *gateway-name* gtp]** hierarchy level. The parameters configured here are applicable to all GTP peers that use the interface.

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services on the S4 Interface on page 265
- gtp (S-GW) on page 1019

## s5

**Syntax**

```
s5 {
  control {
    dscp-code-point value;
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    forwarding-classclass-name;
    interface {
      interface-name;
      v4-address v4-address;
    }
    n3-requests requests;
    path-management (disable | enable);
    support-16-bit-sequence; #P-GW only
    t3-response response-interval;
    ttl-value ttl-value; #S-GW only
  }
  data {
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    interface {
      interface-name;
      v4-address v4-address;
    }
    n3-requests requests; #P-GW only
    path-management (disable | enable);
    t3-response response-interval; #P-GW only
  }
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  interface {
    interface-name;
    v4-address v4-address;
  }
  n3-requests requests;
  path-management (disable | enable);
  t3-response response-interval;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *name* gtp],
[edit unified-edge gateways sgw *name* gtp],

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *name* gtp]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the path and tunnel management parameters for the 3GPP S5 interface. This configuration overrides the parameters configured at a higher level in the hierarchy and applies to all GTP peers that connect to the S5 interface. You can also configure

parameters only for GTP control packets or GTP user plane packets—these parameters override the parameters at the higher hierarchy levels.

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- gtp (GGSN or P-GW) on page 1014
- gtp (S-GW) on page 1019

## s8

**Syntax**

```
s8 {
  control {
    dscp-code-point value;
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    forwarding-classclass-name;
    interface {
      interface-name;
      v4-addressv4-address;
    }
    n3-requests requests;
    path-management (disable | enable);
    support-16-bit-sequence; #P-GW only
    t3-response response-interval;
    ttl-value ttl-value; #S-GW only
  }
  data {
    echo-interval interval;
    echo-n3-requests requests;
    echo-t3-response response-interval;
    interface {
      interface-name;
      v4-addressv4-address;
    }
    n3-requests requests; #P-GW only
    path-management (disable | enable);
    t3-response response-interval; #P-GW only
  }
  echo-interval interval;
  echo-n3-requests requests;
  echo-t3-response response-interval;
  interface {
    interface-name;
    v4-addressv4-address;
  }
  n3-requests requests;
  path-management (disable | enable);
  t3-response response-interval;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *name* gtp],
[edit unified-edge gateways sgw *name* gtp]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *name* gtp]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the path and tunnel management parameters for the 3GPP S8 interface. This configuration overrides the parameters configured at a higher level in the hierarchy and applies to all GTP peers that connect to the S8 interface. You can also configure

parameters only for GTP control packets or GTP user plane packets—these parameters override the parameters at the higher hierarchy levels.

The remaining statements are explained separately.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Configuring GTP Services Overview on page 234
- gtp (GGSN or P-GW) on page 1014
- gtp (S-GW) on page 1019

## support-16-bit-sequence

**Syntax**
support-16-bit-sequence;

**Hierarchy Level**
[edit unified-edge gateways ggsn-pgw name gtp peer-group name control],
[edit unified-edge gateways ggsn-pgw *name* gtp s5 control],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 control]

**Release Information**
Statement introduced in Junos OS Mobility Release 11.2W.

**Description**
Enable support for 16-bit sequence numbers for interoperation with older gateways that support a GTP version with a 16-bit sequence number length.

Support for 16-bit sequence numbers is disabled by default.

**Required Privilege Level**
unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Configuring GTP Services Overview on page 234
- gtp (GGSN or P-GW) on page 1014

## t3-response

**Syntax** t3 response *response-interval*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *name* gtp control],
[edit unified-edge gateways ggsn-pgw *name* gtp gn control],
[edit unified-edge gateways ggsn-pgw *name* gtp gp control],
[edit unified-edge gateways ggsn-pgw *name* gtp s5 control],
[edit unified-edge gateways ggsn-pgw *name* gtp s8],
[edit unified-edge gateways ggsn-pgw *name* gtp s8 control],
[edit unified-edge gateways sgw *name* gtp control],
[edit unified-edge gateways sgw *name* gtp s11],
[edit unified-edge gateways sgw *name* gtp s4 control],
[edit unified-edge gateways sgw *name* gtp s5 control],
[edit unified-edge gateways sgw *name* gtp s8 control]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the following hierarchy levels introduced in Junos OS Mobility Release 11.4W:

- **[edit unified-edge gateways sgw *name* gtp]**
- **[edit unified-edge gateways sgw *name* gtp control]**
- **[edit unified-edge gateways sgw *name* gtp s11]**
- **[edit unified-edge gateways sgw *name* gtp s4 control]**
- **[edit unified-edge gateways sgw *name* gtp s5 control]**
- **[edit unified-edge gateways sgw *name* gtp s8 control]**

**Description** Configure the response timeout for GTP signaling request messages. The response timeout is how long the gateway waits before resending a signaling request message when the response to a request has not been received.

**Options** ***seconds***—Time that the gateway waits before resending a signaling request message.

**Range:** 1 through 30 seconds

**Default:** 5 seconds

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- gtp (GGSN or P-GW) on page 1014
- gtp (S-GW) on page 1019

## traceoptions (GTP)

**Syntax**

```
traceoptions {
  file filename {
    files files;
    (no-world-readable | world-readable);
    size size;
  }
  flag {
    flag;
  }
  level level;
  no-remote-trace;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *name* gtp],
[edit unified-edge gateways sgw *name* gtp]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *name* gtp]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure GTP tracing options. You can specify which trace operations are logged by including specific tracing flags and levels.

**Options**

**file *filename***—Name of the file that receives the output of the tracing operation. All files are placed in the **/var/log** directory.

**files *files***— (Optional) Maximum number of trace files. When a trace file named **trace-file** reaches its maximum size, it is renamed **trace-file.0**, then **trace-file.1**, and so on, until the maximum number of trace files is reached. Then, the oldest trace file is overwritten.

If you specify a maximum number of files, you must also specify a maximum file size with the **size** option and a filename.

**Range:** 2 through 1000

**Default:** 3 files

**flag**

- *flag*—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements. You can use one of the following flags:
  - all—Trace everything.
  - config—Trace configuration-related information.
  - debug—Trace debug information.
  - decode—Trace decoding of received packets.
  - encode—Trace encoding of transmitted packets.

- error—Trace internal and external errors.
- events—Trace all internal and external events.
- packet-io—Trace transmitted and received packets.
- peer—Trace GTP peer-related events.
- tracker—Trace GTP tracker-related events.
- warning—Trace warnings.

**level *level***—(Optional) Level of tracing to perform. You can specify any of the following levels:

- **all**—Match all levels.
- **error**—Match error conditions.
- **info**—Match informational messages.
- **notice**—Match conditions that should be handled specially
- **verbose**—Match verbose messages.
- **warning**—Match warning messages.

**no-remote-trace**—(Optional) Disable remote tracing.

**no-world-readable**—(Optional) Restrict access to the originator of the trace operation only.

**size *size***—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). If you specify a maximum file size, you must also specify a maximum number of trace files with the **files** option and filename.

**Syntax:** **xk** to specify KB, **xm** to specify MB, or **xg** to specify GB

**Range:** 10 KB through 1 GB

**Default:** 128 KB

**world-readable**—(Optional) Enable unrestricted file access.

**Required Privilege Level**

trace and unified-edge—To view this statement in the configuration.
trace-control and unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring GTP Services Overview on page 234
- gtp (GGSN or P-GW) on page 1014
- gtp (S-GW) on page 1019

## ttl-value (S-GW GTP-C)

**Syntax** ttl-value *ttl-value*;

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name* gtp control],
[edit unified-edge gateways sgw *gateway-name* gtp s4 control],
[edit unified-edge gateways sgw *gateway-name* gtp s5 control],
[edit unified-edge gateways sgw *gateway-name* gtp s8 control],
[edit unified-edge gateways sgw *gateway-name* gtp s11]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the time-to-live (TTL) value used on outgoing GPRS tunneling protocol, control plane (GTP-C) packets. When the TTL count in the GTP-C packet reaches zero, the packet is discarded.

**Options** **ttl-value**—TTL value

**Range:** 1 through 255

**Default:** 255

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring General GTP Service on the S-GW on page 257
- control (GTP) on page 995

CHAPTER 27

# Service Applications Configuration Statements

## egress-key (Aggregated Multiservices)

**Syntax** egress-key (destination-ip | source-ip);

**Hierarchy Level** [edit services service-set *service-set-name* interface-service load-balancing-options hash-keys]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the hash keys to be used in the egress flow direction. The configuration is mandatory if you are using AMS for Network Address Translation (NAT). This configuration is not mandatory if you are using AMS for stateful firewall; if the hash keys are not configured, then the defaults are chosen. (See hash-keys (Aggregated Multiservices) for more information.)

**Options** The following hash keys can be configured in the egress direction:

**destination-ip**—Use the destination IP address of the flow to compute the hash used in load balancing.

**source-ip**—Use the source IP address of the flow to compute the hash used in load balancing.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- hash-keys (Aggregated Multiservices) on page 1048

## hash-keys (Aggregated Multiservices)

**Syntax**

```
hash-keys {
  egress-key (destination-ip | source-ip);
  ingress-key (destination-ip | source-ip);
  resource-triggered;
}
```

**Hierarchy Level** [edit services service-set *service-set-name* interface-service load-balancing-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the hash keys used for load balancing in aggregated multiservices (AMS) for service applications (Network Address Translation [NAT], stateful firewall, application-level gateway [ALG], HTTP header enrichment, and mobility). The hash keys supported in the ingress and egress direction are the source IP address and destination IP address.

Hash keys are used to define the load-balancing behavior among the various members in the AMS group. For example, if **hash-keys** is configured as **source-ip**, then the hashing would be performed based on the source IP address of the packet. Therefore, all packets with the same source IP address land on the same member. Hash keys must be configured with respect to the traffic direction: ingress or egress. For example, if **hash-keys** is configured as **source-ip** in the ingress direction, then it should be configured as **destination-ip** in the egress direction. This is required to ensure that the packets of the same flow reach the same member of the AMS group.

The configuration of the ingress and egress hash keys is mandatory if you are using AMS for NAT. This configuration is not mandatory if you are using AMS for stateful firewall; if the hash keys are not configured, then the defaults are chosen. Refer to Table 67 on page 1049 for the supported hash keys.

The resource-triggered option enables anchor session PICs to use the load or resource information from the anchor services PICs to select the AMS member will anchor the services for the subscriber for load balancing among AMS members. In addition, for mobile subscriber-aware services (such as HTTP header enrichment), you must configure the **resource-triggered** statement, which means that the load balancing is not done using the ingress and egress keys.

Table 67: Hash Keys Supported for AMS for Service Applications

| | Service Set at Ingress Interface | | Service Set at Egress Interface | |
|---|---|---|---|---|
| **Hash Keys for NAT** | | | | |
| NAT Type | Ingress hash key | Egress hash key | Ingress hash key | Egress hash key |
| source static | Destination IP address | Source IP address | Source IP address | Destination IP address |
| source dynamic | Source IP address | Destination IP address | Destination IP address | Source IP address |
| Network Address Port Translation (NAPT) | Source IP address | Destination IP address | Destination IP address | Source IP address |
| destination static | Source IP address | Destination IP address | Destination IP address | Source IP address |
| **Hash Keys for Stateful Firewall** | | | | |
| Stateful Firewall | Destination IP address | Source IP address | Destination IP address | Source IP address |
| Stateful Firewall | Source IP address | Destination IP address | Source IP address | Destination IP address |

NOTE: If NAT is used in the service set (along with stateful firewall and ALG), then the hash keys should be based on the NAT type; otherwise, the hash keys of the stateful firewall should be used.

The remaining statements are explained separately.

**Required Privilege Level**

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- load-balancing-options (Aggregated Multiservices for Services Applications) on page 1052

## ingress-key (Aggregated Multiservices)

**Syntax** ingress-key (destination-ip | source-ip);

**Hierarchy Level** [edit services service-set *service-set-name* interface-service load-balancing-options hash-keys]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the hash keys to be used in the ingress flow direction. The configuration is mandatory if you are using AMS for Network Address Translation (NAT). This configuration is not mandatory if you are using AMS for stateful firewall; if the hash keys are not configured, then the defaults are chosen.

**Options** The following hash keys can be configured in the ingress direction:

**destination-ip**—Use the destination IP address of the flow to compute the hash used in load balancing.

**source-ip**—Use the source IP address of the flow to compute the hash used in load balancing.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- hash-keys (Aggregated Multiservices) on page 1048

## interface-service (Aggregated Multiservices)

**Syntax**

```
interface-service {
  load-balancing-options {
    hash-keys {
      egress-key (destination-ip | source-ip);
      ingress-key (destination-ip | source-ip);
      resource-triggered;
    }
  }
  service-interface interface-name.unit-number;
}
```

**Hierarchy Level** [edit services service-set *service-set-name*]

**Release Information** Statement introduced before Junos OS Release 7.4.
Support for aggregated multiservices (AMS) interfaces introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the interface name and unit number to be used in aggregated multiservices (AMS) with high availability (HA) for service applications (Network Address Translation [NAT], stateful firewall, application-level gateway [ALG], HTTP header enrichment, and mobility), and configure the load-balancing options in AMS with high availability for service applications.

**Options** **service-interface** ***interface-name.unit-number***—Name and unit number of the AMS interface; for example, **ams0.1**, where **ams0** is the interface and **1** is the unit number.

NOTE: **Unit 0 is reserved and cannot be configured under the AMS interface.**

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- service-set (Aggregated Multiservices) on page 1054

## load-balancing-options (Aggregated Multiservices for Services Applications)

**Syntax**

```
load-balancing-options {
  hash-keys {
    egress-key (destination-ip | source-ip);
    ingress-key (destination-ip | source-ip);
    resource-triggered;
  }
}
```

**Hierarchy Level** [edit services service-set *service-set-name* interface-service]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the load-balancing options for aggregated multiservices (AMS) in service applications (Network Address Translation [NAT], stateful firewall, application-level gateway [ALG], HTTP header enrichment, and mobility). AMS for service applications can be used for load balancing with or without high availability (HA). Currently, load balancing is based on the configured hash keys.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- interface-service (Aggregated Multiservices) on page 1051

## resource-triggered (Aggregated Multiservices)

**Syntax** resource-triggered;

**Hierarchy Level** [edit services service-set *service-set-name* interface-service load-balancing-options hash-keys]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify that the load balancing for aggregated multiservices (AMS) for services applications should be triggered based on the resources (load) information from the services PICs.

If the HTTP header enrichment service is configured as a mobility subscriber-aware service, then the anchor services PIC can be configured as either a multiservices interface (for example **ms-1/0/0**) or an AMS interface (for example **ams0**). If it is configured as an AMS interface, then the load balancing must be performed by the anchor session PICs, which are configured using the **resource-triggered** statement. Therefore, the **resource-triggered** statement is mandatory for subscriber-aware services using AMS interfaces.

Only one service set can be configured with resource triggering as the load-balancing behavior.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- hash-keys (Aggregated Multiservices) on page 1048

## service-set (Aggregated Multiservices)

**Syntax**

```
service-set service-set-name {
  interface-service {
    load-balancing-options {
      hash-keys {
        egress-key (destination-ip | source-ip);
        ingress-key (destination-ip | source-ip);
        resource-triggered;
      }
    }
    service-interface interface-name.unit-number;
  }
  [tag-rule-sets rule-set-name];
  [tag-rules rule-name];
  service-set-options {
    subscriber-awareness;
  }
}
```

**Hierarchy Level** [edit services]

**Release Information** Statement introduced before Junos OS Release 7.4.
Support for aggregated multiservices (AMS) interfaces introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the service set with aggregated multiservices (AMS) for load balancing in service applications. Currently, Network Address Translation (NAT), stateful firewall, application-level gateway (ALG), HTTP header enrichment, and mobility are the service applications supported.

The following ALGs are currently supported:

- FTP
- Internet Control Message Protocol (ICMP)
- Point-to-Point Tunneling Protocol (PPTP)
- Real-Time Streaming Protocol (RTSP)
- SQL *Net
- TCP
- traceroute
- Trivial File Transfer Protocol (TFTP)
- UDP

AMS for service applications (NAT, stateful firewall, and ALG) can be used for load balancing with or without high availability. Many-to-one (N:1) high availability (HA) is supported for service applications (NAT, stateful firewall, and ALG). In this case, one multiservices PIC is the backup for one or more (N) active multiservices PICs. If one of the active multiservices PICs goes down, then the backup replaces it as the active

multiservices PIC. When the failed PIC comes back online, it becomes the new backup. This is called floating backup mode.

NOTE: In high availability for service applications, the configuration state is synchronized to the backup. However, the operational state of the active members is not synchronized to the backup. Therefore, in the case of failure, existing flows meant for the failed member are lost.

The following conditions are applicable if you use AMS for load balancing in service applications:

- All the member interfaces of the AMS interface must have the same packages configured for the respective service applications. For example, if **mams-5/0/0** is the active member and **mams-5/1/0** the backup, then both **mams-5/0/0** and **mams-5/1/0** must have the same packages.
  - For NAT, the member interfaces must have the **jservices-nat** package configured.
  - For stateful firewall, the member interfaces must have the **jservices-sfw** package configured.
  - For ALG, the member interfaces must have the **jservices-alg** package configured.
- The size of the object cache (**object-cache-size**) and the size of the policy database (**policy-db-size**) must be appropriately configured so that the memory requirements of the services application policy database are met.
- For anchor session PICs, currently, AMS member PICs operate only in 64-bit mode. Therefore the **boot-os embedded-junos64** configuration, at the **[edit chassis fpc *slot-number* pic *pic-number* adaptive-services service-package extension-provider]** hierarchy level, is mandatory for all member interfaces.

The remaining statements are explained separately.

**Options** ***service-set-name***—Name of the service set.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

CHAPTER 28

# System Architecture and Gateway Traceoptions Configuration Statements



## System Architecture Configuration Statements

## call-rate-statistics

**Syntax**

```
call-rate-statistics {
    history history;
    interval interval;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*],
[edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the [edit unified-edge gateways sgw *gateway-name*] hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the parameters related to the broadband gateway's call-rate statistics. You can specify the number of past intervals for which the call-rate statistics are stored, and the interval for which the call-rate statistics are calculated.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- [edit unified-edge gateways] Hierarchy Level on page 604
- show unified-edge ggsn-pgw call-rate statistics on page 1394
- show unified-edge sgw call-rate statistics on page 1400

## disable (Idle Mode Buffering)

**Syntax** disable;

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name* idle-mode-buffering]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Disable idle mode buffering on the Serving Gateway (S-GW). When idle mode buffering is disabled, the S-GW does *not* buffer the downlink packets meant for the user equipment (UE) that is in idle mode.

Idle mode buffering uses 1 GB of memory when it is enabled. When it is disabled, this memory is used by the daemon handling subscriber management.

NOTE: Idle mode buffering can be disabled only when the S-GW is in maintenance mode. When idle mode buffering is changed from enabled to disabled or vice versa, all services PICs of the corresponding S-GW are rebooted.

**Default** If you do not configure this statement, then idle mode buffering is enabled.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring an S-GW on a Broadband Gateway on page 29
- idle-mode-buffering on page 1063

## expire-timer (Idle Mode Buffering)

**Syntax** expire-timer *time-in-seconds*;

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name* idle-mode-buffering]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the expire timer for idle mode buffering in the Serving Gateway (S-GW). After the configured time elapses for a bearer, buffered packets are discarded by the S-GW.

**Options** ***time-in-seconds***—Expire timer, in seconds.
**Default:** 200 seconds
**Range:** 30 through 300 seconds

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Configuring an S-GW on a Broadband Gateway on page 29
- idle-mode-buffering on page 1063

## family (Mobile Interface)

**Syntax** family *family-name* {...}

**Hierarchy Level** [edit interfaces *interface-name* unit *interface-unit-number*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the protocol family information for the logical interface.

**Options** ***family-name***—Protocol family. The following options are supported:

- **inet**—IP version 4 suite.
- **inet6**—IP version 6 suite.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**
- Configuring Mobile Interfaces for APNs on page 126
- unit (Mobile Interface) on page 1074

## filter (Mobile Interface)

**Syntax**

```
filter {
  input input-filter;
  output output-filter;
}
```

**Hierarchy Level** [edit interfaces *interface-name* unit *interface-unit-number*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the access control list (ACL) filters to apply to uplink and downlink traffic. By default, the mobile interface (**mif**)—that is, the access point name (APN)—accepts all mobile traffic of the subscribers that are using this APN (**mif**).

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Mobile Interfaces for APNs on page 126
- unit (Mobile Interface) on page 1074

## forwarding-packages

**Syntax**

```
forwarding-packages {
  mobility {
    ggsn-pgw;
    sgw;
  }
}
```

**Hierarchy Level** [edit chassis fpc *fpc-slot* pfe *pfe-id*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the Packet Forwarding Engine so that it can be used to anchor mobile sessions. If this configuration is changed, then the FPC reboots.

The **forwarding-packages** statement can be configured at the Packet Forwarding Engine level. Therefore, you can configure a subset of Packet Forwarding Engines in an FPC to be mobile anchors.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Interface DPCs or MPCs for User Mobility Traffic on page 64
- Example: Configuring the MobileNext Broadband Gateway Chassis

## ggsn-pgw

**Syntax** ggsn-pgw *gateway-name* { ... }

**Hierarchy Level** [edit unified-edge gateways]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the name to be used for the broadband gateway. The broadband gateway can be configured as a gateway GPRS support node (GGSN), as a Packet Data Network Gateway (P-GW), or as both a GGSN and a P-GW.

The remaining statements are explained separately.

**Options** ***gateway-name***—Name of the gateway.
**Range:** Up to 63 characters

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- [edit unified-edge gateways ggsn-pgw <gateway-name>] Hierarchy Level on page 604
- Configuring Broadband Gateway Home PLMNs and Gateways on page 11

## history (Call-Rate Statistics)

**Syntax** history *history*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* call-rate-statistics],
[edit unified-edge gateways sgw *gateway-name* call-rate-statistics]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the [edit unified-edge gateways sgw *gateway-name* call-rate-statistics] hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the number of past intervals for which the call-rate statistics are stored by the broadband gateway.

**Options** ***history***—Number of past intervals for which the call-rate statistics are stored.
**Range:** 1 through 20
**Default:** 1

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- call-rate-statistics on page 1057
- show unified-edge ggsn-pgw call-rate statistics on page 1394
- show unified-edge sgw call-rate statistics on page 1400

## home-plmn

**Syntax**

```
home-plmn {
  mcc [mcc] {
    mnc [mnc];
  }
}
```

**Hierarchy Level**

[edit unified-edge gateways ggsn-pgw *gateway-name*],
[edit unified-edge gateways sgw *gateway-name*]

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.
Support at the [edit unified-edge gateways sgw *gateway-name*] hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description**

Configure the operator's home public land mobile networks (HPLMNs) that the broadband gateway and its access point names (APNs) recognize. The HPLMN consists of the mobile country code (MCC) and its corresponding mobile network codes (MNCs).

NOTE: Configuring the **home-plmn** statement is optional for the Serving Gateway (S-GW). In order to select the charging profile for a subscriber, the S-GW uses the Serving Network PLMN provided as part of the Serving Network Information Element (IE) in the Create Session Request message. If the Serving Network IE is not available, then the S-GW uses the home PLMN configuration for selecting the charging profile.

The remaining statements are explained separately.

**Required Privilege Level**

unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Broadband Gateway Home PLMNs and Gateways on page 11
- **ggsn-pgw on page 1061**
- Configuring an S-GW on a Broadband Gateway on page 29

## idle-mode-buffering

**Syntax**

```
idle-mode-buffering {
  disable;
  expire-timer time-in-seconds;
}
```

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the idle mode buffering options for the Serving Gateway (S-GW). When a user equipment (UE) is in idle mode, the S-GW buffers the downlink packets meant for that user equipment.

The remaining statements are explained separately.

**Default** If you do not configure this statement, then idle mode buffering is enabled with an **expire-timer** of 200 seconds.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring an S-GW on a Broadband Gateway on page 29
- sgw on page 1073

## input (Mobile Interface)

**Syntax** input *input-filter*;

**Hierarchy Level** [edit interfaces *interface-name* unit *interface-unit-number* filter]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the access control list (ACL) filter to apply to uplink traffic. By default, the mobile interface (**mif**)—that is,the access point name (APN)—accepts all uplink traffic of the subscribers that are using the APN (**mif**).

**Options** ***input-filter***—Name of the ACL filter.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Mobile Interfaces for APNs on page 126
- filter (Mobile Interface) on page 1060

## interface

**Syntax** interface *interface-name*;

**Hierarchy Level** [edit routing-instances],
[edit logical-systems logical-system-name routing-instances routing-instance-name]

**Release Information** Statement introduced before Junos OS Release 7.4.
The option to configure mobile interfaces (**mif-**) introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the mobile interface to access point name (APN) mapping in a virtual routing and forwarding table (VRF) by placing both the mobile interface logical interface unit and the physical interface unit (the Gi or SGi interface for the APN), in the same VRF.

**Options** ***interface-name***—Name of the mobile interface logical interface unit or the physical interface unit. For example, **mif.1** or **ge-0/0/0.5**.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**
- Configuring Mobile Interface to APN Associations in VRFs on page 128

## interfaces (Mobile Interface)

**Syntax**

```
interfaces mif {
  description description;
  disable;
  mtu mtu-size;
  multi-chassis-protection { ... }
  no-traps;
  traceoptions { ... }
  unit interface-unit-number{
    clear-dont-fragment-bit;
    description description;
    disable;
    family family-name {...}
    filter {
      input input-filter;
      output output-filter;
    }
    (no-traps | traps);
  }
}
```

**Hierarchy Level** [edit]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the mobile interfaces for access point name (APN) mobile traffic. The mobile interfaces are distinct from other types of interfaces and are used to associate an APN with a physical interface in a virtual routing and forwarding (VRF) table. You need to configure one mobile interface unit for every APN. Every APN is associated with a single logical interface (unit) on a physical port represented by a mobile interface unit.

The remaining statements are explained separately.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Mobile Interfaces for APNs on page 126

## interval (Call-Rate Statistics)

**Syntax** interval *interval*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* call-rate-statistics],
[edit unified-edge gateways sgw *gateway-name* call-rate-statistics]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the [edit unified-edge gateways sgw *gateway-name* call-rate-statistics] hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the interval for which the call-rate statistics are calculated by the broadband gateway.

**Options** ***interval***—Interval, in minutes, for which the call-rate statistics are calculated.

**Range:** 5 through 120 minutes

**Default:** 60 minutes

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- call-rate-statistics on page 1057
- show unified-edge ggsn-pgw call-rate statistics on page 1394
- show unified-edge sgw call-rate statistics on page 1400

## local-policy-profile (Broadband Gateway)

**Syntax** local-policy-profile *local-policy-profile*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*],
[edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Specify a local policy profile for the broadband gateway.

- For the broadband gateway configured as a gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW), the local policy profile is a combination of the quality-of-service (QoS) policy (**cos-policy-profile**), the classifier policy (**classifier-profile**), and the resource threshold policy (**resource-threshold-policy**).
- For the broadband gateway configured as a Serving Gateway (S-GW), the local policy profile is a combination of the classifier policy (**classifier-profile**) and the resource threshold policy (**resource-threshold-policy**).

NOTE: **The local policy profile must already be configured at the [edit unified-edge] hierarchy level.**

**Options** ***local-policy-profile***—Name of the local policy profile.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- local-policy-profile (APN) on page 764 (P-GW only)

## maximum-bearers (Broadband Gateway)

**Syntax** maximum-bearers *maximum-bearers*;

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*],
[edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** For the broadband gateway configured as a gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW), configure the maximum number of Evolved Packet System (EPS) bearers or packet data protocol (PDP) contexts allowed.

For the broadband gateway configured as a Serving Gateway (S-GW), configure the maximum number of EPS bearers allowed.

**Options** ***maximum-bearers***—Maximum number of bearers for the broadband gateway.

**Range:** 100,000 through 12,000,000 bearers

**Default:** 12,000,000 bearers

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring the Maximum Number of Bearers on page 334
- maximum-bearers (APN) on page 766 (P-GW only)

## mcc

**Syntax**

```
mcc [mcc] {
  mnc [mnc];
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* home-plmn],
[edit unified-edge gateways sgw *gateway-name* home-plmn]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the [edit unified-edge gateways sgw *gateway-name* home-plmn] hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the mobile country codes (MCCs) for the operator's home public land mobile networks (HPLMNs) that the broadband gateway and its access point names (APNs) recognize. For each MCC, you can configure a list of mobile network codes (MNCs).

NOTE: This is a mandatory configuration for the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW).

The remaining statement is explained separately.

**Options** *mcc*—Mobile country code.

**Syntax:** The MCC must be three digits long and can contain numbers from 0 through 9.

NOTE: The MCC/MNC combination 00101 is reserved for test networks.

To configure multiple MCCs, include the **mcc** statement multiple times.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Broadband Gateway Home PLMNs and Gateways on page 11
- home-plmn on page 1062
- Configuring an S-GW on a Broadband Gateway on page 29

## mnc

**Syntax** mnc [*mnc*];

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name* home-plmn mcc],
[edit unified-edge gateways sgw *gateway-name* home-plmn mcc]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the [edit unified-edge gateways sgw *gateway-name* home-plmn mcc] hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Configure the mobile network codes (MNCs) belonging to the mobile country codes (MCCs) for the operator's home public land mobile networks (HPLMNs) that the broadband gateway and its access point names (APNs) recognize.

NOTE: This is a mandatory configuration for the gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW).

**Options** *mnc*—Mobile network code.

**Syntax:** The MNC must be at least two digits long and a maximum of three digits long. It can contain numbers from 0 through 9.

NOTE: The MCC/MNC combination 00101 is reserved for test networks.

To configure multiple MNCs, include the **mnc** statement multiple times.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Broadband Gateway Home PLMNs and Gateways on page 11
- mcc on page 1069
- Configuring an S-GW on a Broadband Gateway on page 29

## mobility

**Syntax**

```
mobility {
  ggsn-pgw;
  sgw;
}
```

**Hierarchy Level** [edit chassis fpc *fpc-slot* pfe *pfe-id* forwarding-packages]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
**sgw** statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the forwarding package that the Packet Forwarding Engines associated with mobility must use.

NOTE:

- You must include every Packet Forwarding Engine configured with the **ggsn-pgw** forwarding package at the **[edit unified-edge gateways ggsn-pgw *gateway-name* system anchor-pfes]** hierarchy level on the broadband gateway. If you do not specify the Packet Forwarding Engine as an anchor interface, then the Packet Forwarding Engine will not be used by the broadband gateway.
- You must include every Packet Forwarding Engine configured with the **sgw** forwarding package at the **[edit unified-edge gateways sgw *gateway-name* system anchor-pfes]** hierarchy level on the broadband gateway. If you do not specify the Packet Forwarding Engine as an anchor interface, then the Packet Forwarding Engine will not be used by the broadband gateway.

**Options**

**ggsn-pgw**—Configure the router as a gateway GPRS support node (GGSN) or as a Packet Data Network Gateway (P-GW).

**sgw**—Configure the router as a Serving Gateway (S-GW).

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Interface DPCs or MPCs for User Mobility Traffic on page 64
- Example: Configuring the MobileNext Broadband Gateway Chassis
- forwarding-packages on page 1060

## mtu (Mobile Interface)

**Syntax** mtu *mtu-size*;

**Hierarchy Level** [edit interfaces *interface-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the maximum transmission unit (MTU) size for the mobile interface. MTU sizes can be important because the GPRS tunneling protocol (GTP) tunneling can cause a data unit to exceed the maximum frame size when the tunnel headers are added, which causes an error. However, larger MTU sizes increase throughput.

**Options** ***mtu-size***—MTU size.

**Range:** 256 through 9192 bytes

**Default:** 500 bytes (INET, INET6, and ISO families), 1448 bytes (MPLS)

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Mobile Interfaces for APNs on page 126
- interfaces (Mobile Interface) on page 1065

## output (Mobile Interface)

**Syntax** output *output-filter*;

**Hierarchy Level** [edit interfaces *interface-name* unit *interface-unit-number* filter]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the access control list (ACL) filter to apply to downlink traffic. By default, the mobile interface (**mif**)—that is, the access point name (APN)—accepts all downlink traffic of the subscribers that are using the APN (**mif**).

**Options** ***output-filter***—Name of the ACL filter.

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Mobile Interfaces for APNs on page 126
- filter (Mobile Interface) on page 1060

## remote-delete-on-peer-fail

**Syntax** remote-delete-on-peer-fail;

**Hierarchy Level** [edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify that the Serving Gateway (S-GW) sends a delete message to the Packet Data Network Gateway (P-GW) when the S-GW detects that a peer has failed.

**Default** If you do not include the **remote-delete-on-peer-fail** statement, then the S-GW only deletes the packet data protocol (PDP) contexts or bearers locally on the S-GW.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- Configuring an S-GW on a Broadband Gateway on page 29
- sgw on page 1073

## sgw

**Syntax** sgw *gateway-name* { ... }

**Hierarchy Level** [edit unified-edge gateways]

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Specify the name to be used for the Serving Gateway (S-GW).

The remaining statements are explained separately.

**Options** ***gateway-name***—Name of the gateway.
**Range:** Up to 63 characters in length.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**
- [edit unified-edge gateways sgw <gateway-name>] Hierarchy Level on page 615
- Configuring an S-GW on a Broadband Gateway on page 29

## unit (Mobile Interface)

**Syntax**

```
unit interface-unit-number{
  clear-dont-fragment-bit;
  description description;
  disable;
  family family-name {...}
  filter {
    input input-filter;
    output output-filter;
  }
  (no-traps | traps);
}
```

**Hierarchy Level** [edit interfaces *interface-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Configure the logical interface on the physical device. You must configure a logical interface to be able to use the physical device.

The remaining statements are explained separately.

**Options** ***interface-unit-number***—Number of the logical unit.

**Range:** 0 through 16,384

**Required Privilege Level** interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Mobile Interfaces for APNs on page 126
- interfaces (Mobile Interface) on page 1065

## Gateway Traceoptions Configuration Statements

## client (Resource Management)

**Syntax**

```
client {
  traceoptions {
    file filename {
      files files;
      match match;
      (no-world-readable | world-readable);
      size size;
    }
    flag {
      flag;
    }
    level level;
    no-remote-trace;
  }
}
```

**Hierarchy Level** [edit unified-edge resource-management]

**Description** Define the tracing options for the resource management client (the session Dense Port Concentrators [DPCs] and interface DPCs and Modular Port Concentrators [MPCs]). Resource management tracing operations record detailed messages about the operation of resource management clients on the broadband gateway.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Resource Manager Trace Options on page 18
- resource-management (MobileNext Broadband Gateway) on page 1077

## mobile-options

**Syntax**

```
mobile-options {
  traceoptions {
    file filename {
      files files;
      match match;
      (no-world-readable | world-readable);
      size size;
    }
    flag {
      flag;
    }
    no-remote-trace;
  }
}
```

**Hierarchy Level** [edit unified-edge]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Specify the tracing options for the mobility daemon.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- [edit unified-edge] Hierarchy Level on page 600
- Configuring Mobile Options Trace Options on page 16

## resource-management (MobileNext Broadband Gateway)

**Syntax**

```
resource-management {
  client {
    traceoptions {
      file filename {
        files files;
        match match;
        (no-world-readable | world-readable);
        size size;
      }
      flag {
        flag;
      }
      level level;
      no-remote-trace;
    }
  }
  server {
    traceoptions {
      file filename {
        files files;
        match match;
        (no-world-readable | world-readable);
        size size;
      }
      flag {
        flag;
      }
      level level;
      no-remote-trace;
    }
  }
}
```

**Hierarchy Level** [edit unified-edge]

**Description** Define the resource management tracing options. Resource management tracing operations record detailed messages about the operation of resource management clients and server on the broadband gateway.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- [edit unified-edge] Hierarchy Level on page 600
- Configuring Resource Manager Trace Options on page 18

## server (Resource Management)

**Syntax**

```
server {
  traceoptions {
    file filename {
      files files;
      match match;
      (no-world-readable | world-readable);
      size size;
    }
    flag {
      flag;
    }
    level level;
    no-remote-trace;
  }
}
```

**Hierarchy Level** [edit unified-edge resource-management]

**Description** Define the tracing options for the resource management server (the active Routing Engine). Resource management tracing operations record detailed messages about the operation of the resource management server on the broadband gateway.

The remaining statements are explained separately.

**Required Privilege Level** unified-edge—To view this statement in the configuration.
unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Resource Manager Trace Options on page 18
- resource-management (MobileNext Broadband Gateway) on page 1077

## traceoptions (Broadband Gateway)

**Syntax**

```
traceoptions {
  file filename {
    files files;
    match match;
    (no-world-readable | world-readable);
    size size;
  }
  flag {
    flag;
  }
  level level;
  no-remote-trace;
}
```

**Hierarchy Level** [edit unified-edge gateways ggsn-pgw *gateway-name*],
[edit unified-edge gateways sgw *gateway-name*]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
Support at the **[edit unified-edge gateways sgw *gateway-name*]** hierarchy level introduced in Junos OS Mobility Release 11.4W.

**Description** Define the tracing operations for the broadband gateway. You can specify which trace operations are logged by including specific tracing flags and levels.

**Options**

**file *filename***—Name of the file that receives the output of the tracing operation. All files are placed in the **/var/log** directory.

**files *files***— (Optional) Maximum number of trace files. When a trace file named **trace-file** reaches its maximum size, it is renamed **trace-file.0**, then **trace-file.1**, and so on, until the maximum number of trace files is reached. Then, the oldest trace file is overwritten.

If you specify a maximum number of files, you must also specify a maximum file size with the **size** option and a filename.

**Range:** 2 through 1000

**Default:** 3 files

**flag**

- *flag*—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements. You can use one of the following flags:
  - **all**—Trace everything.
  - **bulkjob**—Trace events that are handled by bulk jobs in order to prevent system overload.
  - **config**—Trace configuration events.
  - **cos-cac**—Trace class of service (CoS) and call admission control (CAC) events.

- **ctxt**—Trace user equipment, Packet Data Network (PDN), or bearer context events.
- **fsm**—Trace mobile subscriber finite state machine (FSM) events.
- **gtpu**—Trace GPRS tunneling protocol, user plane (GTP-U) events.
- **ha**—Trace high availability events.
- **init**—Trace initialization events.
- **pfem**—Trace Packet Forwarding Engine Manager events.
- **stats**—Trace **stats** events. This flag is used internally by Juniper's engineers.
- **waitq**—Trace **waitq** events. This flag is used internally by Juniper's engineers.

**level *level***—(Optional) Level of tracing to perform. You can specify any of the following levels:

- **all**—Match all levels.
- **critical**—Match critical conditions.
- **error**—Match error conditions.
- **info**—Match informational messages.
- **notice**—Match conditions that should be handled specially
- **verbose**—Match verbose messages.
- **warning**—Match warning messages.

**match *match***—(Optional) Refine the output to include lines that contain the regular expression.

**no-remote-trace**—(Optional) Disable remote tracing.

**no-world-readable**—(Optional) Restrict access to the originator of the trace operation only.

**size *size***—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). If you specify a maximum file size, you must also specify a maximum number of trace files with the **files** option and filename.

**Syntax:** **xk** to specify KB, **xm** to specify MB, or **xg** to specify GB

**Range:** 10 KB through 1 GB

**Default:** 128 KB

**world-readable**—(Optional) Enable unrestricted file access.

**Required Privilege Level**

trace and unified-edge—To view this statement in the configuration.
trace-control and unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- [edit unified-edge gateways] Hierarchy Level on page 604
- Configuring General Gateway Trace Options on page 14
- Configuring S-GW Traceoptions on page 32

## traceoptions (Mobile Options)

**Syntax**

```
traceoptions {
  file filename {
    files files;
    match match;
    (no-world-readable | world-readable);
    size size;
  }
  flag {
    flag;
  }
  no-remote-trace;
}
```

**Hierarchy Level** [edit unified-edge mobile-options]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Define the tracing options for the mobility daemon.

Tracing options record detailed messages about the operation of the mobility daemon. You can specify which trace operations are logged by including specific tracing flags and levels.

**Options**

**file *filename***—Name of the file that receives the output of the tracing operation. All files are placed in the **/var/log** directory.

**files *files***—(Optional) Maximum number of trace files. When a trace file named **trace-file** reaches its maximum size, it is renamed **trace-file.0**, then **trace-file.1**, and so on, until the maximum number of trace files is reached. Then, the oldest trace file is overwritten.

If you specify a maximum number of files, you must also specify a maximum file size with the **size** option and a filename.

**Range:** 2 through 1000

**Default:** 3 files

**flag**

- *flag*—You can use one of the following flags:
  - **all**—Trace everything for the mobility daemon.
  - **configuration**—Trace configuration commands.
  - **error**—Trace events related to errors in the daemon.
  - **init**—Trace events related to the protocol initialization daemon.
  - **protocol**—Trace protocol processing events.

**match *match***—(Optional) Refine the output to include lines that contain the regular expression.

**no-remote-trace**—(Optional) Disable remote tracing.

**no-world-readable**—(Optional) Restrict access to the originator of the trace operation only.

**size *size***—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). If you specify a maximum file size, you must also specify a maximum number of trace files with the **files** option and filename.

**Syntax:** **xk** to specify KB, **xm** to specify MB, or **xg** to specify GB

**Range:** 10 KB through 1 GB

**Default:** 128 KB

**world-readable**—(Optional) Enable unrestricted file access.

**Required Privilege Level**

trace and unified-edge—To view this statement in the configuration.
trace-control and unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Mobile Options Trace Options on page 16
- mobile-options on page 1076

## traceoptions (Resource Management Client)

**Syntax**

```
traceoptions {
  file filename {
    files files;
    match match;
    (no-world-readable | world-readable);
    size size;
  }
  flag {
    flag;
  }
  level level;
  no-remote-trace;
}
```

**Hierarchy Level** [edit unified-edge resource-management client]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Define the tracing options for the resource management client (the session Dense Port Concentrators [DPCs] and interface DPCs and Modular Port Concentrators [MPCs]). Resource management tracing operations record detailed messages about the operation of resource management clients on the broadband gateway. You can specify which trace operations are logged by including specific tracing flags and levels.

**Options** file *filename*—Name of the file that receives the output of the tracing operation. All files are placed in the **/var/log** directory.

NOTE: The FPC and PIC slot numbers are appended to the specified filename to obtain a unique filename for each DPC.

files *files*— (Optional) Maximum number of trace files. When a trace file named **trace-file** reaches its maximum size, it is renamed **trace-file.0**, then **trace-file.1**, and so on, until the maximum number of trace files is reached. Then, the oldest trace file is overwritten.

If you specify a maximum number of files, you must also specify a maximum file size with the **size** option and a filename.

**Range:** 2 through 1000

**Default:** 3 files

**flag**

- *flag*—You can use one of the following flags:

NOTE: Currently, only the all flag is supported. The other flags are not fully supported.

- **all**—Trace everything.
- **communication**—Trace Inter-Process Communication (IPC) code.
- **info-tables**—Trace information table code.
- **infra**—Trace finite state machine (FSM) and infra code.
- **memory**—Trace memory management code.
- **redundancy**—Trace graceful Routing Engine switchover (GRES) code.
- **resource-tables**—Trace resource table code.

**level *level***—(Optional) Level of tracing to perform. You can specify any of the following levels:

- **all**—Match all levels.
- **error**—Match error conditions.
- **info**—Match informational messages.
- **notice**—Match conditions that should be handled specially
- **verbose**—Match verbose messages.
- **warning**—Match warning messages.

**match *match***—(Optional) Refine the output to include lines that contain the regular expression.

**no-remote-trace**—(Optional) Disable remote tracing.

**no-world-readable**—(Optional) Restrict access to the originator of the trace operation only.

**size *size***—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). If you specify a maximum file size, you must also specify a maximum number of trace files with the **files** option and filename.

**Syntax:** **xk** to specify KB, **xm** to specify MB, or **xg** to specify GB

**Range:** 10 KB through 1 GB

**Default:** 128 KB

**world-readable**—(Optional) Enable unrestricted file access.

**Required Privilege Level**

trace and unified-edge—To view this statement in the configuration.
trace-control and unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- client (Resource Management) on page 1075
- Configuring Resource Manager Trace Options on page 18

## traceoptions (Resource Management Server)

**Syntax**

```
traceoptions {
  file filename {
    files files;
    match match;
    (no-world-readable | world-readable);
    size size;
  }
  flag {
    flag;
  }
  level level;
  no-remote-trace;
}
```

**Hierarchy Level** [edit unified-edge resource-management server]

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Define the tracing options for the resource management server (the active Routing Engine). Resource management tracing operations record detailed messages about the operation of the resource management server on the broadband gateway. You can specify which trace operations are logged by including specific tracing flags and levels.

**Options**

**file *filename***—Name of the file that receives the output of the tracing operation. All files are placed in the **/var/log** directory.

NOTE: The FPC and PIC slot numbers are appended to the specified filename to obtain a unique filename for each DPC.

**files *files***— (Optional) Maximum number of trace files. When a trace file named **trace-file** reaches its maximum size, it is renamed **trace-file.0**, then **trace-file.1**, and so on, until the maximum number of trace files is reached. Then, the oldest trace file is overwritten.

If you specify a maximum number of files, you must also specify a maximum file size with the **size** option and a filename.

**Range:** 2 through 1000

**Default:** 3 files

**flag**

- *flag*—You can use one of the following flags:

NOTE: Currently, only the **all** flag is supported. The other flags are not fully supported.

- **all**—Trace everything.
- **communication**—Trace infra code.
- **configuration**—Trace configuration code.
- **gres**—Trace graceful Routing Engine switchover (GRES) code.
- **info-manager**—Trace information management code.
- **init**—Trace events related to the Resource Management and Packet Steering Deamon(RMPSD) initialization sequence of messages.
- **memory**—Trace memory management code.
- **packet-steering**—Trace packet-steering code.
- **resource-manager**—Trace resource management code.
- **signal**—Trace signal-handling code.
- **state**—Trace state-handling code.
- **timer**—Trace timer code.
- **ui**—Trace user interface code.

**level** ***level***—(Optional) Level of tracing to perform. You can specify any of the following levels:

- **all**—Match all levels.
- **error**—Match error conditions.
- **info**—Match informational messages.
- **notice**—Match conditions that should be handled specially
- **verbose**—Match verbose messages.
- **warning**—Match warning messages.

**match** ***match***—(Optional) Refine the output to include lines that contain the regular expression.

**no-remote-trace**—(Optional) Disable remote tracing.

**no-world-readable**—(Optional) Restrict access to the originator of the trace operation only.

**size** ***size***—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). If you specify a maximum file size, you must also specify a maximum number of trace files with the **files** option and filename.

**Syntax:** **xk** to specify KB, **xm** to specify MB, or **xg** to specify GB

**Range:** 10 KB through 1 GB

**Default:** 128 KB

**world-readable**—(Optional) Enable unrestricted file access.

**Required Privilege Level**

trace and unified-edge—To view this statement in the configuration.
trace-control and unified-edge-control—To add this statement to the configuration.

**Related Documentation**

- Configuring Resource Manager Trace Options on page 18
- server (Resource Management) on page 1078

PART 12

# Command Reference

CHAPTER 29

# AAA Operational Commands

## clear unified-edge ggsn-pgw aaa radius statistics

**Syntax**

**clear unified-edge ggsn-pgw aaa radius statistics (accounting | all | authentication | dynamic-requests)**
**<fpc-slot *fpc-slot*>**
**<gateway-name *gateway-name*>**
**<name *name*>**
**<pic-slot *pic-slot*>**

**Release Information**

Command introduced in Junos OS Mobility Release 11.2W.
**gateway-name** option introduced in Junos OS Mobility Release 11.4W.

**Description**

Clear statistics for the authentication, authorization, and accounting (AAA) RADIUS server for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then statistics for all GGSNs and P-GWs are cleared.

**Options**

**accounting | all | authentication | dynamic-requests**—Clear statistics for the specified parameter.

**fpc-slot *fpc-slot***—(Optional) Clear the statistics for the specified Flexible PIC Concentrator (FPC).

**gateway-name *gateway-name***—(Optional) Clear the statistics for the specified GGSN or P-GW.

**name *name***—(Optional) Clear the statistics for the specified server.

**pic-slot *pic-slot***—(Optional) Clear the statistics for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**Required Privilege Level**

clear, unified-edge

**Related Documentation**

- show unified-edge ggsn-pgw aaa radius statistics on page 1102

**List of Sample Output**

clear unified-edge ggsn-pgw aaa radius statistics all on page 1094

**Output Fields**

When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**clear unified-edge ggsn-pgw aaa radius statistics all**

```
user@host> clear unified-edge ggsn-pgw aaa radius statistics all

Cleared all RADIUS statistics
```

## clear unified-edge ggsn-pgw aaa statistics

**Syntax**

**clear unified-edge ggsn-pgw aaa statistics (accounting | all | authentication | dynamic-requests))**
**<fpc-slot *fpc-slot*>**
**<gateway-name *gateway-name*>**
**<pic-slot *pic-slot*>**

**Release Information**

Command introduced in Junos OS Mobility Release 11.2W.
**gateway-name** option introduced in Junos OS Mobility Release 11.4W.

**Description**

Clear the global authentication, authorization, and accounting (AAA) statistics for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then statistics for all GGSNs and P-GWs are cleared.

**Options**

**accounting | all | authentication | dynamic-requests**—Clear statistics for the specified parameter.

**fpc-slot *fpc-slot***—(Optional) Clear the statistics for the specified Flexible PIC Concentrator (FPC).

**gateway-name *gateway-name***—(Optional) Clear the statistics for the specified GGSN or P-GW.

**pic-slot *pic-slot***—(Optional) Clear the statistics for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**Required Privilege Level**

clear, unified-edge

**Related Documentation**

- show unified-edge ggsn-pgw aaa radius statistics on page 1102

**List of Sample Output**

clear unified-edge ggsn-pgw aaa statistics all on page 1095

**Output Fields**

When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**clear unified-edge ggsn-pgw aaa statistics all**

```
user@host> clear unified-edge ggsn-pgw aaa statistics all

Cleared all AAA statistics
```

## clear unified-edge ggsn-pgw address-assignment pool

**Syntax** clear unified-edge ggsn-pgw address-assignment pool name *pool-name*
<gateway *gateway*>
<routing-instance *routing-instance*>

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
**gateway** option introduced in Junos OS Mobility Release 11.4W.

**Description** Clear the sessions that have been assigned addresses from the specified mobile pool for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then the sessions for all GGSNs and P-GWs are cleared.

**Options**

**name *pool-name***—Clear the sessions for the specified mobile pool.

**gateway *gateway***—(Optional) Clear the sessions on the specified GGSN or P-GW.

**routing-instance *routing-instance***—(Optional) Clear the sessions on the specified routing instance.

**Required Privilege Level** clear, unified-edge

**Related Documentation**

- show unified-edge ggsn-pgw address-assignment pool on page 1120

**List of Sample Output** clear unified-edge ggsn-pgw address-assignment pool name pool-1 on page 1096

**Output Fields** When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**clear unified-edge ggsn-pgw address-assignment pool name pool-1**

```
user@host> clear unified-edge ggsn-pgw address-assignment pool name pool-1

Initiated clearing of sessions in the pool
```

## clear unified-edge ggsn-pgw address-assignment statistics

**Syntax** **clear unified-edge ggsn-pgw address-assignment statistics**
**<fpc-slot *fpc-slot*>**
**<gateway *gateway*>**
**<pic-slot *pic-slot*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
**gateway** option introduced in Junos OS Mobility Release 11.4W.

**Description** Clear the global address assignment statistics for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then the statistics for all GGSNs and P-GWs are cleared.

**Options**

**fpc-slot *fpc-slot* pic-slot *pic-slot***—(Optional) Clear the statistics for the services PIC in the specified FPC and PIC slots.

**gateway *gateway***—(Optional) Clear the statistics for the specified GGSN or P-GW.

**Required Privilege Level** clear, unified-edge

**Related Documentation**
- show unified-edge ggsn-pgw address-assignment statistics on page 1126

**List of Sample Output** clear unified-edge ggsn-pgw address-assignment statistics on page 1097

**Output Fields** When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**clear unified-edge ggsn-pgw address-assignment statistics**

```
user@host> clear unified-edge ggsn-pgw address-assignment statistics

Cleared address-assignment statistics
```

## show unified-edge ggsn-pgw aaa network-element status

**Syntax** **show unified-edge ggsn-pgw aaa network-element status**
**<fpc-slot *fpc-slot*>**
**<gateway-name *gateway-name*>**
**<name *name*>**
**<pic-slot *pic-slot*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
**gateway-name** option introduced in Junos OS Mobility Release 11.4W.

**Description** Display the authentication, authorization, and accounting (AAA) network element status for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then the status for all GGSNs and P-GWs is displayed.

**Options** **none**—Display the network element group status for all the GGSNs or P-GWs.

**fpc-slot *fpc-slot***—(Optional) Display the status for the specified Flexible PIC Concentrator (FPC).

**gateway-name *gateway-name***—(Optional) Display the status for the specified GGSN or P-GW.

**name *name***—(Optional) Display the status for the specified network element.

**pic-slot *pic-slot***—(Optional) Display the status for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge ggsn-pgw aaa network-element-group status on page 1100

**List of Sample Output** show unified-edge ggsn-pgw aaa network-element status on page 1099

**Output Fields** Table 68 on page 1098 lists the output fields for the **show unified-edge ggsn-pgw aaa network-element status** command. Output fields are listed in the approximate order in which they appear.

### Table 68: show unified-edge ggsn-pgw aaa network-element status Output Fields

| Field Name | Field Description |
|---|---|
| **Server** | Name of the RADIUS server that is part of the network element. |
| **FPC/PIC** | FPC and PIC slot numbers through which the network element was reached. |
| **Priority** | Priority of the RADIUS server in the network element. Within a network element, a RADIUS server can be assigned a priority of 1 or 2. |

Table 68: show unified-edge ggsn-pgw aaa network-element status Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **State** | State of the RADIUS server: dead or active. |

## Sample Output

**show unified-edge ggsn-pgw aaa network-element status**

```
user@host> show unified-edge ggsn-pgw aaa network-element status

Network-element: rad (FPC/PIC: 4/0)
  Server: rad, Priority: 1, State: Active

Network-element: rad1 (FPC/PIC: 4/0)
  Server: rad1, Priority: 1, State: Active
```

## show unified-edge ggsn-pgw aaa network-element-group status

**Syntax** **show unified-edge ggsn-pgw aaa network-element-group status**
<**brief | detail**>
<**fpc-slot** *fpc-slot*>
<**gateway-name** *name*>
<**name** *name*>
<**pic-slot** *pic-slot*>

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
**gateway-name** option introduced in Junos OS Mobility Release 11.4W.

**Description** Display the authentication, authorization, and accounting (AAA) network element group status for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then the status for all GGSNs and P-GWs is displayed.

**Options** **none**—(Same as brief) Display the network element group status in brief.

**brief | detail**—(Optional) Display the specified level of output.

**fpc-slot** *fpc-slot*—(Optional) Display the status for the specified Flexible PIC Concentrator (FPC).

**gateway-name** *name*—(Optional) Display the status for the specified GGSN or P-GW.

**name** *name*—(Optional) Display the status for the specified network element group.

**pic-slot** *pic-slot*—(Optional) Display the status for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge ggsn-pgw aaa network-element status on page 1098

**List of Sample Output** show unified-edge ggsn-pgw aaa network-element-group status brief on page 1101
show unified-edge ggsn-pgw aaa network-element-group status detail on page 1101

**Output Fields** Table 69 on page 1100 lists the output fields for the **show unified-edge ggsn-pgw aaa network-element-group status** command. Output fields are listed in the approximate order in which they appear.

### Table 69: show unified-edge ggsn-pgw aaa network-element-group status Output Fields

| Field Name | Field Description |
|---|---|
| **network element-group** | Name of the network element group. |
| **Broadcast** | Indicates whether the broadcast knob has been enabled for this network element group. If the broadcast knob is enabled, the broadband gateway can broadcast accounting messages to all of the network elements in the group. |

Table 69: show unified-edge ggsn-pgw aaa network-element-group status Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Members** | Members of the network element group and their mandatory status in the group. |

## Sample Output

**show unified-edge ggsn-pgw aaa network-element-group status brief**

```
user@host> show unified-edge ggsn-pgw aaa network-element-group status brief

network element-group: NEG_1
  Broadcast: Disabled
  Members:
    ne1, Mandatory: No
    ne2, Mandatory: No

network element-group: NEG_2
  Broadcast: Enabled
  Members:
    ne1, Mandatory: Yes
    ne2, Mandatory: No

network element-group: ne_group1
  Broadcast: Enabled
  Members:
    ne1, Mandatory: No
    ne2, Mandatory: Yes
```

**show unified-edge ggsn-pgw aaa network-element-group status detail**

```
user@host> show unified-edge ggsn-pgw aaa network-element-group status detail

network element-group: NEG_1
 Broadcast: Disabled
 Members:
    ne1, Mandatory: No
    ne2, Mandatory: No
```

## show unified-edge ggsn-pgw aaa radius statistics

**Syntax**

**show unified-edge ggsn-pgw aaa radius statistics (authentication | accounting | dynamic-requests)**
**<brief | detail | summary>**
**<fpc-slot *fpc-slot*>**
**<gateway-name *gateway-name*>**
**<name *name*>**
**<pic-slot *pic-slot*>**

**Release Information**

Command introduced in Junos OS Mobility Release 11.2W.
**gateway-name** option introduced in Junos OS Mobility Release 11.4W.

**Description**

Display the statistics for the authentication, authorization, and accounting (AAA) RADIUS server for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then statistics for all GGSNs and P-GWs is displayed.

**Options**

**authentication | accounting | dynamic-requests**—Display the statistics for the specified parameter.

**brief | detail | summary**—(Optional) Display the specified level of output.

**fpc-slot *fpc-slot***—(Optional) Display the statistics for the specified Flexible PIC Concentrator (FPC).

**gateway-name *gateway-name***—(Optional) Display the statistics for the specified GGSN or P-GW.

**name *name***—(Optional) Display the statistics for the specified RADIUS server.

**pic-slot *pic-slot***—(Optional) Display the statistics for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**Required Privilege Level**

view

**Related Documentation**

- clear unified-edge ggsn-pgw aaa radius statistics on page 1094
- show unified-edge ggsn-pgw aaa statistics on page 1111

**List of Sample Output**

**Output Fields** Table 70 on page 1103 lists the output fields for the **show unified-edge ggsn-pgw aaa radius statistics** command. Output fields are listed in the approximate order in which they appear.

### Table 70: show unified-edge ggsn-pgw aaa radius statistics Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| The following statistics are displayed only when this command is executed with either the **accounting** or **authentication** options. | | |
| **RADIUS server** | Name of the RADIUS server. | All levels |
| **Address** | IP address of the RADIUS server. | All levels |
| **Port** | Port number of the RADIUS server. | All levels |
| **FPC/PIC** | FPC and PIC slot numbers for which the statistics are displayed. | **All levels** |
| **Routing-instance** | Routing instance under which the RADIUS server is configured. | **detail** |
| **State** | State of the RADIUS server, that is, whether the server is active or inactive (dead). | All levels |
| **Duration** | Duration, in HH:MM:SS format, for which the RADIUS server has been in the current state. | All levels |
| **Previous duration** or **Prev duration** | Duration, in HH:MM:SS format, for which the RADIUS server was in the previous state. | All levels |
| **Flaps** | Number of times that the RADIUS server transitioned from the active to inactive state. | All levels |
| The following statistics are displayed only when this command is executed with the **accounting** option. | | |
| **Requests** | Number of accounting requests sent to the RADIUS server from the FPC slot and PIC slot. | **brief**<br>**summary** |
| **Accounting Requests** | Number of accounting requests sent to the RADIUS server from the FPC slot and PIC slot. The following information is displayed about each request type:<br>• **Start**—Number of Accounting Start requests sent.<br>• **Stop**—Number of Accounting Stop requests sent.<br>• **Interim**—Number of Accounting Interim-Update requests sent.<br>• **On**—Number of Accounting On requests sent.<br>• **Off**—Number of Accounting Off requests sent. | **detail** |
| **Accounting req retransmissions** | Number of accounting requests retransmitted to the RADIUS server. | **detail** |
| **Responses** or **Accounting Responses** | Number of accounting responses received from the RADIUS server. | All levels |

Table 70: show unified-edge ggsn-pgw aaa radius statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Malformed responses** | Number of malformed accounting responses received from the RADIUS server. | **detail** |
| **Bad authenticators** | Number of responses received from the RADIUS server with bad authenticators. | **detail** |
| **Pending requests** | Number of accounting requests waiting for responses from the RADIUS server. | **detail** |
| **Timeouts** | Number of accounting requests to the RADIUS server that timed out. | **detail** |
| **Unknown types** | Number of unknown type responses (that the gateway does not recognize) received from the RADIUS server. | **detail** |
| **Packets dropped** | Number of packets dropped. | **detail** |
| **Round trip time (ms)** | Time taken to receive the response from the RADIUS server. The minimum, average, and maximum round-trip times are also displayed. | **detail** |
| **Time since counters were last cleared** | Time, in hours, minutes, and seconds, since the accounting counters were last cleared. | **detail** |
| The following statistics are displayed only when this command is executed with the **authentication** option. | | |
| **Requests** | Number of access requests sent to the RADIUS server from the FPC slot and PIC slot. | **brief**<br>**summary** |
| **Access req retransmissions** | Number of access requests retransmitted to the RADIUS server. | **detail** |
| **Access rejects** | Number of access requests rejected by the RADIUS server. | All levels |
| **Access challenges** | Number of Access Challenge responses received from the RADIUS server. | **detail** |
| **Malformed responses** | Number of malformed access responses received from the RADIUS server. | **detail** |
| **Bad authenticators** | Number of bad authentication responses received. | **detail** |
| **Pending requests** | Number of access requests waiting for responses from the RADIUS server. | **detail** |
| **Timeouts** | Number of access requests to the RADIUS server that timed out. | **detail** |
| **Unknown types** | Number of unknown type responses (that the gateway does not recognize) received from the RADIUS server. | **detail** |
| **Packets dropped** | Number of packets dropped. | **detail** |

Table 70: show unified-edge ggsn-pgw aaa radius statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Round trip time (ms)** | Time taken to receive the response from the RADIUS server. The minimum, average, and maximum round-trip times are also displayed. | **detail** |
| **Time since counters were last cleared** | Time, in hours, minutes, and seconds, since the authentication counters were last cleared. | **detail** |
| The following statistics are displayed only when this command is executed with the **dynamic-requests** option. | | |
| **RADIUS client** | Name of the RADIUS client. | All levels |
| **Address** | IP address of the RADIUS client. | All levels |
| **CoA requests received** | Number of Change of Authorization (COA) requests received from the RADIUS client. | All levels |
| **DM requests received** | Number of Disconnect Message (DM) requests received from the RADIUS client. | All levels |
| **CoA Acks sent** | Number of COA acknowledgements sent to the RADIUS client. | All levels |
| **CoA Nacks sent** | Number of COA negative acknowledgements sent to the RADIUS client. | All levels |
| **DM Acks sent** | Number of Disconnect Message acknowledgements sent to the RADIUS client. | All levels |
| **DM Nacks sent** | Number of Disconnect Message negative acknowledgements sent to the RADIUS client. | All levels |
| **Dropped** | Number of dynamic authorization requests dropped. | All levels |
| **Duplicates** | Number of duplicate dynamic authorization requests. | **detail** |
| **Forwarded** | Number of dynamic authorization requests that were forwarded. | **detail** |
| **Timeouts** | Number of dynamic authorization requests that timed out. | **detail** |
| **Delivered** | Number of dynamic authorization requests that were delivered. | **detail** |
| **Invalid RADIUS codes** | Number of dynamic authorization requests with invalid RADIUS codes. | **detail** |
| **Errors during processing** | Number of dynamic authorization requests that could not be processed due to errors. | **detail** |
| **Invalid RADIUS authenticators** | Number of dynamic authorization requests with invalid RADIUS authenticators. | **detail** |

Table 70: show unified-edge ggsn-pgw aaa radius statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Invalid or missing Charging Ids** | Number of dynamic authorization requests with invalid charging IDs or that did not contain charging IDs. | **detail** |
| **Session mapping errors** | Number of dynamic authorization requests that caused session mapping errors during processing. | **detail** |
| **Time since counters were last cleared** | Time, in hours, minutes, and seconds, since the dynamic requests counters were last cleared. | **detail** |

## Sample Output

**show unified-edge ggsn-pgw aaa radius statistics accounting brief**

```
user@host> show unified-edge ggsn-pgw aaa radius statistics accounting brief

RADIUS server: rad1
Address: 7.1.1.2 Port: 1813
FPC/                            Previous
PIC  State        Duration      Duration Flaps   Requests  Responses
 2/1 Active       00:52:03      00:00:00     0          0          0

RADIUS server: radius_server
Address: 4.1.1.2 Port: 1813
FPC/                            Previous
PIC  State        Duration      Duration Flaps   Requests  Responses
 2/1 Active       00:52:03      00:00:00     0      10001      10001
```

**show unified-edge ggsn-pgw aaa radius statistics accounting detail**

```
user@host> show unified-edge ggsn-pgw aaa radius statistics accounting detail
RADIUS server: rad1 (FPC/PIC: 2/1)
  Address: 7.1.1.2 Port: 1813
  Routing-instance: default
  State: Active  Duration: 00:53:47
  Prev duration: 00:00:00      Flaps: 0
  Accounting requests: 0
    Start: 0      Stop: 0      Interim: 0      On: 0      Off: 0
  Accounting req retransmissions: 0
  Accounting responses: 0
  Malformed responses: 0
  Bad authenticators: 0
  Pending requests: 0
  Timeouts: 0
  Unknown types: 0
  Packets dropped: 0
  Round trip time (ms): 0 (Min: 0 Max: 0 Avg: 0)
  Time since counters were last cleared: 00:00:00

RADIUS server: radius_server (FPC/PIC: 2/1)
  Address: 4.1.1.2 Port: 1813
  Routing-instance: default
  State: Active  Duration: 00:53:47
  Prev duration: 00:00:00      Flaps: 0
  Accounting requests: 10001
    Start: 10001  Stop: 0      Interim: 0      On: 0      Off: 0
  Accounting req retransmissions: 0
  Accounting responses: 10001
```

```
  Malformed responses: 0
  Bad authenticators: 0
  Pending requests: 0
  Timeouts: 0
  Unknown types: 0
  Packets dropped: 0
  Round trip time (ms): 1 (Min: 0 Max: 14 Avg: 1)
  Time since counters were last cleared: 00:00:00
```

**show unified-edge ggsn-pgw aaa radius statistics accounting summary**

```
user@host> show unified-edge ggsn-pgw aaa radius statistics accounting summary

RADIUS server: rad1
Address: 7.1.1.2 Port: 1813
FPC/                            Previous
PIC  State        Duration      Duration Flaps   Requests  Responses
 2/1 Active       00:54:14      00:00:00     0          0          0

RADIUS server: radius_server
Address: 4.1.1.2 Port: 1813
FPC/                            Previous
PIC  State        Duration      Duration Flaps   Requests  Responses
 2/1 Active       00:54:14      00:00:00     0      10001      10001
```

**show unified-edge ggsn-pgw aaa radius statistics authentication brief**

```
user@host> show unified-edge ggsn-pgw aaa radius statistics authentication brief

RADIUS server: rad1
Address: 7.1.1.2 Port: 1812
FPC/                            Previous
PIC  State        Duration      Duration Flaps   Requests  Responses
 2/1 Active       00:54:36      00:00:00     0      10003      10003

RADIUS server: radius_server
Address: 4.1.1.2 Port: 1812
FPC/                            Previous
PIC  State        Duration      Duration Flaps   Requests  Responses
 2/1 Active       00:54:36      00:00:00     0      10001      10001
```

**show unified-edge ggsn-pgw aaa radius statistics authentication detail**

```
user@host> show unified-edge ggsn-pgw aaa radius statistics authentication detail
RADIUS server: rad1 (FPC/PIC: 2/1)
  Address: 7.1.1.2 Port: 1812
  Routing-instance: default
  State: Active  Duration: 00:54:40
  Prev duration: 00:00:00      Flaps: 0
  Access requests: 10003
  Access req retransmissions: 1811
  Access accepts: 10003
  Access rejects: 0
  Access challenges: 0
  Malformed responses: 0
  Bad authenticators: 0
  Pending requests: 0
  Timeouts: 0
  Unknown types: 0
  Packets dropped: 0
  Round trip time (ms): 1 (Min: 0 Max: 25 Avg: 2)
  Time since counters were last cleared: 00:00:00
```

```
RADIUS server: radius_server (FPC/PIC: 2/1)
  Address: 4.1.1.2 Port: 1812
  Routing-instance: default
  State: Active  Duration: 00:54:40
  Prev duration: 00:00:00      Flaps: 0
  Access requests: 10001
  Access req retransmissions: 1
  Access accepts: 10001
  Access rejects: 0
  Access challenges: 0
  Malformed responses: 0
  Bad authenticators: 0
  Pending requests: 0
  Timeouts: 0
  Unknown types: 0
  Packets dropped: 0
  Round trip time (ms): 1 (Min: 0 Max: 34 Avg: 1)
  Time since counters were last cleared: 00:00:00
```

### show unified-edge ggsn-pgw aaa radius statistics authentication summary

```
user@host> show unified-edge ggsn-pgw aaa radius statistics authentication summary

RADIUS server: rad1
Address: 7.1.1.2 Port: 1812
FPC/                            Previous
PIC  State        Duration      Duration Flaps   Requests  Responses
 2/1 Active       00:54:45      00:00:00     0      10003      10003

RADIUS server: radius_server
Address: 4.1.1.2 Port: 1812
FPC/                            Previous
PIC  State        Duration      Duration Flaps   Requests  Responses
 2/1 Active       00:54:45      00:00:00     0      10001      10001
```

### show unified-edge ggsn-pgw aaa radius statistics dynamic-requests brief

```
user@host> show unified-edge ggsn-pgw aaa radius statistics dynamic-requests brief

RADIUS client: rad1
Address: 7.1.1.2
  CoA requests received: 0
  DM requests received: 0
  CoA Acks sent: 0
  CoA Nacks sent: 0
  DM Acks sent: 0
  DM Nacks sent: 0
  Dropped: 0
RADIUS client: radius_server
Address: 4.1.1.2
  CoA requests received: 0
  DM requests received: 0
  CoA Acks sent: 0
  CoA Nacks sent: 0
  DM Acks sent: 0
  DM Nacks sent: 0
  Dropped: 0
```

### show unified-edge ggsn-pgw aaa radius statistics

```
user@host> show unified-edge ggsn-pgw aaa radius statistics dynamic-requests detail
RADIUS client: rad1 (FPC/PIC: 2/1)
  Address: 7.1.1.2
```

dynamic-requests detail

```
  CoA requests received: 0
  DM requests received: 0
  CoA Acks sent: 0
  CoA Nacks sent: 0
  DM Acks sent: 0
  DM Nacks sent: 0
  Dropped: 0
  Duplicates: 0
  Forwarded: 0
  Timeouts: 0
  Delivered: 0
  Invalid RADIUS codes: 0
  Errors during processing: 0
  Invalid RADIUS authenticators: 0
  Invalid or missing Charging Ids: 0
  Session mapping errors: 0
  Time since counters were last cleared: 00:00:00

RADIUS client: radius_server (FPC/PIC: 2/1)
  Address: 4.1.1.2
  CoA requests received: 0
  DM requests received: 0
  CoA Acks sent: 0
  CoA Nacks sent: 0
  DM Acks sent: 0
  DM Nacks sent: 0
  Dropped: 0
  Duplicates: 0
  Forwarded: 0
  Timeouts: 0
  Delivered: 0
  Invalid RADIUS codes: 0
  Errors during processing: 0
  Invalid RADIUS authenticators: 0
  Invalid or missing Charging Ids: 0
  Session mapping errors: 0
  Time since counters were last cleared: 00:00:00
```

show unified-edge ggsn-pgw aaa radius statistics dynamic-requests summary

```
user@host> show unified-edge ggsn-pgw aaa radius statistics dynamic-requests summary

RADIUS client: rad1
Address: 7.1.1.2
  CoA requests received: 0
  DM requests received: 0
  CoA Acks sent: 0
  CoA Nacks sent: 0
  DM Acks sent: 0
  DM Nacks sent: 0
  Dropped: 0
RADIUS client: radius_server
Address: 4.1.1.2
  CoA requests received: 0
  DM requests received: 0
  CoA Acks sent: 0
  CoA Nacks sent: 0
  DM Acks sent: 0
  DM Nacks sent: 0
```

```
Dropped: 0
```

## show unified-edge ggsn-pgw aaa statistics

**Syntax**

show unified-edge ggsn-pgw aaa statistics (accounting | authentication | dynamic-requests)
<brief | detail | extensive>
<fpc-slot *fpc-slot*>
<gateway-name *gateway-name*>
<pic-slot *pic-slot*>

**Release Information**

Command introduced in Junos OS Mobility Release 11.2W.
**gateway-name** option introduced in Junos OS Mobility Release 11.4W.

**Description**

Display the global statistics for accounting, authentication, and dynamic requests for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then statistics for all GGSNs and P-GWs are displayed.

**Options**

**authentication | accounting | dynamic-requests**—Display the statistics for the specified parameter.

**brief | detail | extensive**—(Optional) Display the specified level of output.

**fpc-slot *fpc-slot***—(Optional) Display the statistics for the specified Flexible PIC Concentrator (FPC).

**gateway-name *gateway-name***—(Optional) Display the statistics for the specified GGSN or P-GW.

**pic-slot *pic-slot***—(Optional) Display the statistics for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**Required Privilege Level**

view

**Related Documentation**

- clear unified-edge ggsn-pgw aaa statistics on page 1095
- show unified-edge ggsn-pgw aaa radius statistics on page 1102

**List of Sample Output**



**Output Fields**

Table 71 on page 1112 lists the output fields for the **show unified-edge ggsn-pgw aaa statistics** command. Output fields are listed in the approximate order in which they appear.

## Table 71: show unified-edge ggsn-pgw aaa statistics Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway Name** | Name of the GGSN or P-GW. If the statistics for all gateways are displayed, then "All" is displayed. | All levels |
| **FPC/PIC** | FPC and PIC slot numbers for which the statistics are displayed. | **detail**<br>**extensive** |
| **Accounting Module Statistics**—The following statistics are displayed when the **accounting** option is used. | | |
| **Requests** | Total number of Accounting Request packets sent. | All levels |
| **Responses success** | Number of Accounting Response Success packets received. | All levels |
| **Requests timed out** | Number of accounting requests that timed out and did not receive a response. | All levels |
| **Requests retransmitted** | Number of accounting requests that were retransmitted because they did not receive a response. | All levels |
| **Transmit errors** | Number of errors that occurred during the transmission of Accounting Request packets. | All levels |
| **Response errors** | Number of erroneous responses received. | All levels |
| **Pending requests** | Number of accounting requests waiting for responses. | All levels |
| **Authentication Module Statistics**—The following statistics are displayed when the **authentication** option is used. | | |
| **Requests** | Number of access requests sent. | All levels |
| **Accepts** | Number of Access Accept responses received. | All levels |
| **Rejects** | Number of Access Reject responses received. | All levels |
| **Challenges** | Number of Access Challenge responses received. | All levels |
| **Requests timed out** | Number of authentication requests that did not receive a response. | All levels |
| **Requests retransmitted** | Number of authentication requests that were retransmitted because they did not receive a response. | All levels |
| **Transmit errors** | Number of errors that occurred during the transmission of Authentication Request packets. | All levels |
| **Response errors** | Number of erroneous responses received. | All levels |
| **Pending requests** | Number of authentication requests waiting for responses. | All levels |

Table 71: show unified-edge ggsn-pgw aaa statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Dynamic Requests Module Statistics**—The following statistics are displayed when the **dynamic-requests** option is used. | | |
| **Requests received** | Total number of dynamic requests received. | All levels |
| **CoA requests received** | Number of Change of Authorization (COA) requests received. | All levels |
| **DM requests received** | Number of Disconnect Message (DM) requests received. | All levels |
| **CoA Acks sent** | Number of COA acknowledgements sent. | All levels |
| **CoA Nacks sent** | Number of COA negative acknowledgements sent. | All levels |
| **DM Acks sent** | Number of Disconnect Message acknowledgements sent. | All levels |
| **DM Nacks sent** | Number of Disconnect Message negative acknowledgements sent. | All levels |
| **Dropped** | Number of dynamic authorization requests dropped. | All levels |
| **Duplicates** | Number of duplicate dynamic authorization requests. | **detail**<br>**extensive** |
| **Forwarded** | Number of dynamic authorization requests that were forwarded. | **detail**<br>**extensive** |
| **Timeouts** | Number of dynamic authorization requests that timed out. | **detail**<br>**extensive** |
| **Delivered** | Number of dynamic authorization requests that were delivered. | **extensive** |
| **Errors during processing** | Number of dynamic authorization requests that could not be processed due to errors. | **extensive** |
| **Unknown clients** | Number of dynamic authorization requests that came from unknown clients. | **extensive** |
| **Invalid AAA codes** | Number of dynamic authorization requests with invalid AAA codes. | **extensive** |
| **Invalid AAA authenticators** | Number of dynamic authorization requests with invalid AAA authenticators. | **extensive** |
| **Invalid or missing Charging Ids** | Number of dynamic authorization requests with invalid charging IDs or that did not contain charging IDs. | **extensive** |

Table 71: show unified-edge ggsn-pgw aaa statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Session mapping errors** | Number of dynamic authorization requests that caused session mapping errors during processing. | **extensive** |
| **Invalid transactions ids** | Number of dynamic authorization requests with invalid transaction IDs. | **extensive** |

## Sample Output

**show unified-edge ggsn-pgw aaa statistics accounting brief**

```
user@host> show unified-edge ggsn-pgw aaa statistics accounting brief

Accounting module statistics
Gateway Name: -All-
  Requests: 10001
  Responses success: 10001
  Requests timed out: 0
  Requests retransmitted: 0
  Transmit errors: 0
  Response errors: 0
  Pending requests: 0
```

**show unified-edge ggsn-pgw aaa statistics accounting detail**

```
user@host> show unified-edge ggsn-pgw aaa statistics accounting detail
```

The output for the **show unified-edge ggsn-pgw aaa statistics accounting** is the same for both the **detail** and **extensive** options.

**show unified-edge ggsn-pgw aaa statistics accounting extensive**

```
user@host> show unified-edge ggsn-pgw aaa statistics accounting extensive

Accounting module statistics (FPC/PIC: -All-)
Gateway Name: 2/1
  Requests: 10001
  Responses success: 10001
  Requests timed out: 0
  Requests retransmitted: 0
  Transmit errors: 0
  Response errors: 0
  Pending requests: 0
```

**show unified-edge ggsn-pgw aaa statistics authentication brief**

```
user@host> show unified-edge ggsn-pgw aaa statistics authentication brief

Authentication module statistics
Gateway Name: -All-
  Requests: 20004
  Accepts: 20004
  Rejects: 0
  Challenges: 0
  Requests timed out: 0
  Requests retransmitted: 1812
  Transmit errors: 0
  Response errors: 0
```

```
  Pending requests: 0
```

**show unified-edge ggsn-pgw aaa statistics authentication detail**

```
user@host> show unified-edge ggsn-pgw aaa statistics authentication detail

Authentication module statistics (FPC/PIC: -All-)
Gateway Name: 2/1
  Requests: 20004
  Accepts: 20004
  Rejects: 0
  Challenges: 0
  Requests timed out: 0
  Requests retransmitted: 1812
  Transmit errors: 0
  Response errors: 0
  Pending requests: 0
```

**show unified-edge ggsn-pgw aaa statistics authentication extensive**

```
user@host> show unified-edge ggsn-pgw aaa statistics authentication extensive

Authentication module statistics (FPC/PIC: -All-)
Gateway Name: 2/1
  Requests: 20004
  Accepts: 20004
  Rejects: 0
  Challenges: 0
  Requests timed out: 0
  Requests retransmitted: 1812
  Transmit errors: 0
  Response errors: 0
  Pending requests: 0
```

**show unified-edge ggsn-pgw aaa statistics dynamic-requests brief**

```
user@host> show unified-edge ggsn-pgw aaa statistics dynamic-requests brief

Dynamic requests module statistics
Gateway Name: -All-
  Requests received: 0
  CoA requests received: 0
  DM requests received: 0
  CoA Acks sent: 0
  CoA Nacks sent: 0
  DM Acks sent: 0
  DM Nacks sent: 0
  Dropped: 0
```

**show unified-edge ggsn-pgw aaa statistics dynamic-requests detail**

```
user@host> show unified-edge ggsn-pgw aaa statistics dynamic-requests detail

Dynamic requests module statistics (FPC/PIC: -All-)
Gateway Name: 2/1
  Requests received: 0
  CoA requests received: 0
  DM requests received: 0
  CoA Acks sent: 0
  CoA Nacks sent: 0
  DM Acks sent: 0
  DM Nacks sent: 0
  Dropped: 0
  Duplicates: 0
```

```
  Forwarded: 0
  Timeouts: 0
```

### show unified-edge ggsn-pgw aaa statistics dynamic-requests extensive

```
user@host> show unified-edge ggsn-pgw aaa statistics dynamic-requests extensive

Dynamic requests module statistics (FPC/PIC: -All-)
Gateway Name: 2/1
  Requests received: 0
  CoA requests received: 0
  DM requests received: 0
  CoA Acks sent: 0
  CoA Nacks sent: 0
  DM Acks sent: 0
  DM Nacks sent: 0
  Dropped: 0
  Duplicates: 0
  Forwarded: 0
  Timeouts: 0
  Delivered: 0
  Errors during processing: 0
  Unknown clients : 0
  Invalid RADIUS codes: 0
  Invalid RADIUS authenticators: 0
  Invalid or missing Charging Ids: 0
  Session mapping errors: 0
  Invalid transactions ids: 0
```

## show unified-edge ggsn-pgw address-assignment group

**Syntax**

**show unified-edge ggsn-pgw address-assignment group**
<**brief | detail**>
<**fpc-slot** *slot-number*>
<**gateway** *gateway-name*>
<**name** *group-name*>
<**pic-slot** *slot-number*>
<**routing-instance** *routing-instance-name*>

**Release Information**

Command introduced in Junos OS Mobility Release 11.2W.
**gateway** option introduced in Junos OS Mobility Release 11.4W.

**Description**

Display the information for the mobile pool groups for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then information for all GGSNs and P-GWs is displayed.

**Options**

**none**—(Same as brief) Display the information about the mobile pool groups in brief.

**brief | detail**—(Optional) Display the specified level of output.

**fpc-slot** *fpc-slot* **pic-slot** *pic-slot*—(Optional) Display the mobile pool groups for the services PIC in the specified FPC and PIC slots.

**gateway** *gateway-name*—(Optional) Display the information about the mobile pool groups for the specified GGSN or P-GW.

**name** *name*—(Optional) Display the information for the specified mobile pool group.

**routing-instance** *routing-instance*—(Optional) Display the mobile pool group information for the specified routing instance.

**Required Privilege Level**

view

**Related Documentation**

- show unified-edge ggsn-pgw address-assignment pool on page 1120

**Output Fields**

Table 72 on page 1117 lists the output fields for the **show unified-edge ggsn-pgw address-assignment group** command. Output fields are listed in the approximate order in which they appear.

Table 72: show unified-edge ggsn-pgw address-assignment-group Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Group** | Name of the mobile pool group. | All levels |
| **FPC/PIC** | FPC and PIC slot numbers. | **detail** |
| **Total addresses** | Total number of addresses available in the mobile pool group. | All levels |

Table 72: show unified-edge ggsn-pgw address-assignment-group Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Addresses in use** | Number of addresses in the mobile pool group that are currently in use. | All levels |
| **Address usage (percent)** | Percentage utilization of the total addresses in the mobile pool group. | All levels |
| **Routing instance** | Routing instance to which the mobile pool group belongs. | All levels |
| **Gateway** | Gateway to which the PIC belongs. | **detail** |
| **Pool information** | The following information about the mobile pools belonging to this mobile pool group is displayed:<br>• **Name**—Name of the mobile pool.<br>• **Total**—Total number of addresses in the mobile pool.<br>• **In use**—Number of addresses in the mobile pool that are in use.<br>• **Util (%)**—Percentage of addresses in the mobile pool that have been used. | All levels |

## Sample Output

**show unified-edge ggsn-pgw address-assignment group brief**

```
user@host> show unified-edge ggsn-pgw address-assignment group brief


Group: grp1
  Total addresses:         512
  Addresses in use:        301
  Address usage (percent): 59
  Routing instance:        default
  Pool information:
                                                          Util
Name                              Total       In-use      (%)
pool2                             256         254         99
pool3                             256         47          18
```

**show unified-edge ggsn-pgw address-assignment group detail**

```
user@host> show unified-edge ggsn-pgw address-assignment group detail

Group: grp1 (FPC/PIC: 4/0)
  Total addresses:         512
  Addresses in use:        0
  Address usage (percent): 0
  Routing instance:        default
  Gateway:                 PGW
  Pool information:
                                                          Util
Name                              Total       In-use      (%)
pool2                             256         0           0
pool3                             256         0           0
```

```
Group: grp1 (FPC/PIC: 4/1)
  Total addresses:          512
  Addresses in use:         301
  Address usage (percent): 59
  Routing instance:         default
  Gateway:                  PGW
  Pool information:
                                                          Util
Name                              Total       In-use      (%)
pool2                             256         254         99
pool3                             256         47          18
```

## show unified-edge ggsn-pgw address-assignment pool

**Syntax** **show unified-edge ggsn-pgw address-assignment pool**
**<brief | detail | summary>**
**<fpc-slot *fpc-slot*>**
**<gateway *gateway-name*>**
**<name *pool-name*>**
**<pic-slot *pic-slot*>**
**<range *range-name*>**
**<ranges>**
**<routing-instance routing-instance>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
**gateway** option introduced in Junos OS Mobility Release 11.4W.

**Description** Display the information about the mobile pools for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then information for all GGSNs and P-GWs is displayed

**Options** **none**—(Same as brief) Display the address information about the mobile pools in brief.

**brief | detail | summary**—(Optional) Display the specified level of output.

**fpc-slot *fpc-slot* pic-slot *pic-slot***—(Optional) Display the mobile pool information for the services PIC in the specified FPC and PIC slots.

**gateway *gateway-name***—(Optional) Display the mobile pool information for the specified GGSN or P-GW.

**name *name***—(Optional) Display the information for the specified mobile pool.

NOTE: Specifying the mobile pool is mandatory if you use the either the **range *range-name*** or the **ranges** option.

**range *range-name***—Display the information for the specified range in the specified pool.

**ranges**—Display the information for all the ranges in the specified pool.

**routing-instance *routing-instance***—(Optional) Display the mobile pool information for the specified routing instance.

**Required Privilege Level** view

**Related Documentation**
- clear unified-edge ggsn-pgw address-assignment pool on page 1096

**Output Fields** Table 73 on page 1121 lists the output fields for the **show unified-edge ggsn-pgw address-assignment pool** command. Output fields are listed in the approximate order in which they appear.

Table 73: show unified-edge ggsn-pgw address-assignment pool Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Pool** or **Name** | Name of the mobile pool. | All levels |
| **FPC/PIC** | FPC and PIC slots of the services PIC for which the mobile pool information is displayed. | **detail** |
| **Total Addresses** or **Total** | Total number of addresses available in the mobile pool. | All levels |
| **Addresses in use** or **In Use** | Number of addresses that have been allocated. | All levels |
| **Addresses skipped** | Number of addresses that are excluded from allocation. | **brief**<br>**detail** |
| **Address usage (percent)** or **Util (%)** | Percentage of the total addresses used. | All levels |
| **Addresses in aging period** | Number of addresses that are currently being released and that cannot be allocated. | **brief**<br>**detail** |
| **Routing Instance** | Name of the routing instance to which the mobile pool belongs. | All levels |
| **Gateway** | Gateway to which the services PIC belongs. | **detail** |
| **Pool Maintenance Mode** | Service mode of the mobile pool; for example, operational or maintenance. | **detail** |
| **Address chunks** | Number of chunks of IP addresses in the mobile pool (for the services PIC) that are currently being assigned | **detail** |
| **Total address chunk size** | Total number of addresses in the address chunk (for the services PIC). | **detail** |
| **Total allocation failures** | Total number of addresses that could not be allocated. | **detail** |

## Sample Output

**show unified-edge ggsn-pgw**

```
user@host> show unified-edge ggsn-pgw address-assignment pool brief
```

address-assignment pool brief

```
Pool: pool1
  Total addresses:           16777215
  Addresses in use:          1600
  Addresses skipped:         416
  Address usage (percent):   0.
  Addresses in aging period: 1600
  Routing instance:          default


Pool: pool2
  Total addresses:           256
  Addresses in use:          254
  Addresses skipped:         2
  Address usage (percent):   99
  Addresses in aging period: 0
  Routing instance:          default

[...output truncated...]
```

show unified-edge ggsn-pgw address-assignment pool detail

```
user@host> show unified-edge ggsn-pgw address-assignment pool detail

Pool: pool1 (FPC/PIC: 4/0)
  Pool Maintenance Mode:     Operational
  Total addresses:           16777215
  Addresses in use:          822
  Addresses skipped:         208
  Address usage (percent):   0.
  Addresses in aging period: 822
  Routing instance:          default
  Gateway:                   PGW
  Address chunks:            26
  Total address chunk size:  26416
  Total allocation failures: 0

Pool: pool1 (FPC/PIC: 4/1)
  Pool Maintenance Mode:     Operational
  Total addresses:           16777215
  Addresses in use:          778
  Addresses skipped:         208
  Address usage (percent):   0.
  Addresses in aging period: 778
  Routing instance:          default
  Gateway:                   PGW
  Address chunks:            26
  Total address chunk size:  26416
  Total allocation failures: 0

Pool: pool2 (FPC/PIC: 4/0)
  Pool Maintenance Mode:     Operational
  Total addresses:           256
  Addresses in use:          0
  Addresses skipped:         0
  Address usage (percent):   0
  Addresses in aging period: 0
  Routing instance:          default
  Gateway:                   PGW
  Address chunks:            0
  Total address chunk size:  0
  Total allocation failures: 0
```

```
[...output truncated...]
```

### show unified-edge ggsn-pgw address-assignment pool summary

```
user@host> show unified-edge ggsn-pgw address-assignment pool summary
                                                          Util
Name                            Total       In-use        (%)  Routing instance
pool1                           16777215    1600          0.   default
pool2                           256         254           99   default
pool3                           256         47            18   default
v4_pool                         16777216    0             0    default
v4_pool1                        16777215    0             0    default
v6_pool                         16777215    0             0    default
v6_pool1                        16777215    0             0    default
```

## show unified-edge ggsn-pgw address-assignment service-mode

**Syntax** **show unified-edge ggsn-pgw address-assignment service-mode**
**<brief | detail>**
**<pool *pool-name*>**
**<routing-instance *routing-instance-name*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Display service mode information about mobile pools.

**Options** **none**—Display the service mode information in brief.

**brief | detail**—(Optional) Display the specified level of output.

**pool *pool-name***—(Optional) Display the service mode information for the specified mobile pool.

**routing-instance *routing-instance-name***—(Optional) Display the service mode information about the mobile pools that are part of the specified routing instance.

**Required Privilege Level** view

**Related Documentation**
- Example: Changing Mobility Pool Attributes on page 438

**List of Sample Output**
show unified-edge ggsn-pgw address-assignment service-mode brief on page 1125
show unified-edge ggsn-pgw address-assignment service-mode detail on page 1125

**Output Fields** Table 74 on page 1124 lists the output fields for the **show unified-edge ggsn-pgw address-assignment service-mode** command. Output fields are listed in the approximate order in which they appear.

### Table 74: show unified-edge ggsn-pgw address-assignment service-mode Output Fields

| Field Name | Field Description |
|---|---|
| **Pool Name** | Name of the mobile pool. |
| **Routing Instance** | Routing instance to which the mobile pool belongs. |
| **Service Mode** | Service mode for the mobile pool:<br>• **Operational**—Mobile pool is in operational mode.<br>• **Maintenance**—Mobile pool is in maintenance mode.<br>• **Maintenance - Active Phase**—All the attributes of the mobile pool can be modified.<br>• **Maintenance - In/Out Phase**—Only the non-maintenance mode attributes of the mobile pool can be modified. |

## Sample Output

**show unified-edge ggsn-pgw address-assignment service-mode brief**

```
user@host> show unified-edge ggsn-pgw address-assignment service-mode brief
Maintenance Mode
    MM Active Phase - System is ready to accept configuration changes for all
                      attributes of this object and its sub-hierarchies.
    MM In/Out Phase - System is ready to accept configuration changes only for
                      non-maintenance mode attributes of this object and
                      its sub-hierarchies.

Routing-Instance               Pool Name                      Service Mode

default                        my_pool                        Operational
default                        v6_pool                        Operational
```

**show unified-edge ggsn-pgw address-assignment service-mode detail**

```
user@host> show unified-edge ggsn-pgw address-assignment service-mode detail
Routing Instance: default
Pool Name       : my_pool
Service Mode    : Operational

Routing Instance: default
Pool Name       : v6_pool
Service Mode    : Operational
```

## show unified-edge ggsn-pgw address-assignment statistics

**Syntax** **show unified-edge ggsn-pgw address-assignment statistics**
<**brief | detail**>
<**fpc-slot** ***fpc-slot***>
<**gateway** ***gateway-name***>
<**pic-slot** ***pic-slot***>

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
**gateway** option introduced in Junos OS Mobility Release 11.4W.

**Description** Display the address assignment statistics for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then the consolidated statistics for all GGSNs and P-GWs are displayed.

**Options** **none**—(Same as brief) Display the address assignment statistics in brief.

**brief | detail**—(Optional) Display the specified level of output.

**fpc-slot** ***fpc-slot*** **pic-slot** ***pic-slot***—(Optional) Display the statistics for the services PIC in the specified FPC and PIC slots.

**gateway** ***gateway-name***—(Optional) Display the consolidated statistics for the specified GGSN or P-GW.

**Required Privilege Level** view

**Related Documentation**
- clear unified-edge ggsn-pgw address-assignment statistics on page 1097

**Output Fields** Table 75 on page 1126 lists the output fields for the **show unified-edge ggsn-pgw address-assignment statistics** command. Output fields are listed in the approximate order in which they appear.

Table 75: show unified-edge ggsn-pgw address-assignment statistics Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **FPC/PIC** | FPC and PIC slots for which the statistics are displayed. | **detail** |
| **Gateway** | Name of the GGSN or P-GW. | **detail**<br>**gateway** |
| **Total address allocations** | Total number of addresses allocated. | All levels |
| **Total allocation failures** | Total number of address allocations that failed. | All levels |
| **Total address releases** | Total number of addresses that were released. | All levels |

## Sample Output

**show unified-edge ggsn-pgw address-assignment statistics**

```
user@host> show unified-edge ggsn-pgw address-assignment statistics


Address assignment statistics
  Total address allocations: 1101
  Total allocation failures: 0
  Total address releases:    800
```

**show unified-edge ggsn-pgw address-assignment statistics detail**

```
user@host> show unified-edge ggsn-pgw address-assignment statistics detail


Address assignment statistics   (FPC/PIC: 4/0)
  Gateway:                  PGW
  Total address allocations: 416
  Total allocation failures: 0
  Total address releases:    416

Address assignment statistics   (FPC/PIC: 4/1)
  Gateway:                  PGW
  Total address allocations: 685
  Total allocation failures: 0
  Total address releases:    384
```

CHAPTER 30

# Anchor Packet Forwarding Engine Redundancy and Aggregated Multiservices High Availability Operational Commands

## request interface load-balancing revert (Aggregated Multiservices)

**Syntax** **request interface load-balancing revert** ***interface-name***

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Revert the aggregated multiservices member interface (**mams-**) from the inactive state to the active or backup state based on the configuration and the operational state of the aggregated multiservices interface.

**Options** ***interface-name***—Name of the member interface. The member interface format is **mams-a/b/0**, where **a** is the FPC slot number and **b** is the PIC slot number.

**Required Privilege Level** view

**Related Documentation**
- request interface load-balancing switchover (Aggregated Multiservices) on page 1131

**List of Sample Output** request interface load-balancing revert mams-4/0/0 (Aggregated Multiservices) on page 1130

**Output Fields** When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**request interface load-balancing revert mams-4/0/0 (Aggregated Multiservices)**

```
user@host> request interface load-balancing revert mams-4/0/0
request succeeded
```

## request interface load-balancing switchover (Aggregated Multiservices)

**Syntax** **request interface load-balancing switchover *interface-name* <force>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Switch the active member interface to the backup state.

In the case of mobile control plane redundancy, the behavior depends on the replication state of the member interface:

- If the sync state is **in-sync**, then the active member is rebooted and the backup member becomes the new active member.
- If the sync-state is **in-progress**, then the **force** option must be used to force the switchover.

WARNING: **In this case, there is a risk of losing subscriber information because the synchronization has not yet been completed.**

**Options** ***interface-name***—Name of the member interface. The member interface format is **mams-a/b/0**, where **a** is the FPC slot number and **b** is the PIC slot number.

**force**—(Optional) Force the switchover from the active member to the backup member.

**Required Privilege Level** view

**Related Documentation**
- request interface load-balancing revert (Aggregated Multiservices) on page 1130

**List of Sample Output** request interface load-balancing switchover force mams-4/0/0 (Aggregated Multiservices) on page 1131

**Output Fields** When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**request interface load-balancing switchover force mams-4/0/0 (Aggregated Multiservices)**

```
user@host> request interface load-balancing switchover force mams-4/0/0
Switchover Initiated
```

## show interfaces anchor-group (Aggregated Packet Forwarding Engine)

**Syntax** **show interfaces anchor-group**
**<brief | detail>**
***interface-name***

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Display interface information for the aggregated Packet Forwarding Engine group.

**Options** **none**—(Same as brief) Display a summary of the aggregated Packet Forwarding Engine interface information.

**brief | detail**—(Optional) Display the specified level of output.

***interface-name***—Name of the interface within the anchor Packet Forwarding Engine group.

NOTE: The interface must be an aggregated Packet Forwarding Engine interface (**apfe-**).

**Required Privilege Level** view

**Related Documentation**
- show unified-edge ggsn-pgw system interfaces on page 1142

**List of Sample Output**
show interfaces anchor-group brief on page 1133
show interfaces anchor-group detail on page 1134

**Output Fields** Table 76 on page 1132 lists the output fields for the **show interfaces anchor-group** command. Output fields are listed in the approximate order in which they appear.

### Table 76: show interfaces anchor-group

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Redundancy Status Legend** | Legend for the redundancy status.<br>• **Active**—Indicates that the anchor Packet Forwarding Engine is operational.<br>• **Inactive**—Indicates that the anchor Packet Forwarding Engine is not operational.<br>• **PF**—Indicates that the primary Packet Forwarding Engine anchor has failed.<br>• **WS**—Indicates that the primary Packet Forwarding Engine is protected by a secondary Packet Forwarding Engine in warm standby mode. | All levels |
| **Group** | Name of the aggregated Packet Forwarding Engine group. | **brief** none |
| **Mode** | Redundancy mode in which the aggregated Packet Forwarding Engine group operates. Currently, only warm standby mode is supported. | **brief** none |

Table 76: show interfaces anchor-group *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Sub-group ID** | Redundancy subgroups within the anchor Packet Forwarding Engine group configuration that has FPCs as members. This is derived out of the Packet Forwarding Engines on a given FPC. For example, if the first Packet Forwarding Engine is assigned the number 0, then all the other Packet Forwarding Engines with sub-group ID 0 form the N:1 redundancy group. | **brief** none |
| **Interface** | Anchor Packet Forwarding Engine interface (**pfe-**). | **brief detail** none |
| **Configured State** | State in which the anchor Packet Forwarding Engine was configured.<br>• **Primary**: Indicates that the anchor Packet Forwarding Engine is in the pool of primary members.<br>• **Secondary**: Indicates that the anchor Packet Forwarding Engine is a backup to all the primary members. | **brief detail** none |
| **Operational State** | Indicates whether the anchor Packet Forwarding Engine is operational (**Active**) or not operational (**Inactive**). | **brief detail** none |
| **Redundancy State** | Redundancy state (primary or secondary) in which the anchor Packet Forwarding Engine was configured. | **brief detail** none |
| **Group Name** | Name of the aggregated Packet Forwarding Engine group. | **detail** |
| **Group Mode** | Redundancy mode in which the aggregated Packet Forwarding Engine group operates. Currently, only warm standby mode is supported. | **detail** |
| **Group Id** | Internal ID generated for the group. | **detail** |
| **Switchover information** | Switchover details, if any. | **detail** |
| **Subgroup identifier** | Redundancy subgroups within the anchor Packet Forwarding Engine group configuration that has FPCs as members. This is derived out of the Packet Forwarding Engines on a given FPC. For example, if the first Packet Forwarding Engine is assigned the number 0, then all the other Packet Forwarding Engines with subgroup ID 0 form the N:1 redundancy group. | **detail** |

## Sample Output

**show interfaces anchor-group brief**

```
user@host> show interfaces anchor-group brief
Redundancy Status Legend:

Active: Operational              Inactive: Non-operational
MS: Manually switched            PF: Primary failed
HS: Hot standby                  WS: Warm standby

Group     Mode  Sub-group  Interface  Configured  Operational    Redundancy
                   ID                    State       State         State

apfe0     WS       0       pfe-4/0/0  Primary     Active         Primary
                           pfe-5/0/0  Secondary   Active         Secondary
```

```
                          2       pfe-4/2/0  Primary     Active         Primary
                                  pfe-5/2/0  Secondary   Active         Secondary
```

**show interfaces anchor-group detail**

```
user@host> show interfaces anchor-group detail
Active: Operational               Inactive: Non-operational
MS: Manually switched             PF: Primary failed
HS: Hot standby                   WS: Warm standby

Group Name: apfe0
  Group Mode: WS                       Group Id: 65
  Switchover information: None
  Interface pfe-4/2/0
    Configured state: Primary          Operational state: Active
    Redundancy state: Primary
    Subgroup identifier: 2
  Interface pfe-4/0/0
    Configured state: Primary          Operational state: Active
    Redundancy state: Primary
    Subgroup identifier: 0
  Interface pfe-5/0/0
    Configured state: Secondary        Operational state: Active
    Redundancy state: Secondary
    Subgroup identifier: 0
  Interface pfe-5/2/0
    Configured state: Secondary        Operational state: Active
    Redundancy state: Secondary
    Subgroup identifier: 2
```

## show interfaces load-balancing (Aggregated Multiservices)

**Syntax** **show interfaces load-balancing**
<**detail**>
<*interface-name*>

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Display information about the aggregated multiservices interface (**ams**) as well as its individual member interfaces and the status of the replication state.

**Options** **none**—Display a summary of the aggregated multiservices interface information.

**detail**—(Optional) Display the specified level of output.

***interface-name***—(Optional) Name of the aggregated multiservices interface (**ams**). If this is omitted, then the information for all the aggregated multiservices interfaces, including those used in control plane redundancy and high availability (HA) for service applications, is displayed.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge ggsn-pgw system interfaces on page 1142

**List of Sample Output**
show interfaces load-balancing on page 1136
show interfaces load-balancing detail on page 1136
show interfaces load-balancing ams0 detail on page 1137

**Output Fields** Table 77 on page 1135 lists the output fields for the **show interfaces load-balancing** command. Output fields are listed in the approximate order in which they appear.

### Table 77: show interfaces load-balancing Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Interface** | Aggregated multiservices interface (**ams**). | **detail** none |
| **State** | State of the aggregated multiservices interface. The following states are possible:<br>• Wait for Members—None of the member interfaces are powered on yet.<br>• Members Seen—All of the member interfaces are online.<br>• Wait Timer—At least one of the member interfaces has joined the **ams** interface.<br>• Up—The **ams** interface is up with the current joined member interfaces. | **detail** none |
| **Last change** | Time (in *hh:mm:ss* [*hours:minutes:seconds*] format) when the state last changed. | **detail** none |
| **Members** | Number of member interfaces (**mams-**). | none |

Table 77: show interfaces load-balancing Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Member count** | Number of member interfaces (**mams-**). | **detail** |
| HA Model | High availability (HA) model supported on the interface. | **detail** none |
| Members | The following information about the member interfaces is displayed:<br>• **Interface**—Name of the member interface.<br>• **Weight**—This output can be ignored for the current release.<br>• **State**—Indicates the state of the member interface (**mams-**). The following states are possible:<br>  • Active—The member is an active member.<br>  • Backup—The member is a backup.<br>  • Discard—The member has not yet rejoined the **ams** interface after failure.<br>  • Down—The member has not yet powered on.<br>  • Inactive—The member has failed to rejoin the **ams** interface within the configured **rejoin-timeout**.<br>  • Invalid—The Multiservices PIC corresponding to the member interface has been configured but is not physically present in the chassis. | **detail** |
| **Sync-state** | Synchronization (sync) status of the control plane redundancy. The sync state is displayed only when the **ams** interface is **Up**.<br>• **Interface**—Name of the member interface.<br>• **Status**—The synchronization status of the member interfaces.<br>  • In progress—The active member is currently synchronizing its state information with the backup member.<br>  • In sync—The active member has finished synchronizing its state information with the backup and the backup is ready to take over if the active member fails.<br>  • NA (Not applicable)—The backup member is not yet ready to synchronize with the active (primary) member. This may occur if the backup is still powered off or still booting.<br>  • Unknown—The daemons are still initializing and the state information is unavailable. | **detail** |

## Sample Output

**show interfaces load-balancing**

```
user@host> show interfaces load-balancing
Interface  State       Last change  Members  HA Model
ams0       Up          00:10:02     4        Many-to-One
```

**show interfaces load-balancing detail**

```
user@host> show interfaces load-balancing detail
Load-balancing interfaces detail
Interface        : ams0
  State          : Up
  Last change    : 00:10:23
  Member count   : 4
  HA Model       : Many-to-One
  Members        :
```

```
    Interface    Weight   State
    mams-4/0/0   10       Active
    mams-4/1/0   10       Active
    mams-5/0/0   10       Active
    mams-5/1/0   10       Backup
  Sync-state     :
    Interface    Status
    mams-4/0/0   Unknown
    mams-4/1/0   Unknown
    mams-5/0/0   Unknown
```

### show interfaces load-balancing ams0 detail

```
user@host> show interfaces load-balancing ams0 detail
Load-balancing interfaces detail
Interface        : ams0
  State          : Up
  Last change    : 00:11:28
  Member count   : 4
  HA Model       : Many-to-One
  Members        :
    Interface    Weight   State
    mams-4/0/0   10       Active
    mams-4/1/0   10       Active
    mams-5/0/0   10       Active
    mams-5/1/0   10       Backup
  Sync-state     :
    Interface    Status
    mams-4/0/0   Unknown
    mams-4/1/0   Unknown
    mams-5/0/0   Unknown
```

## show services ipsec-vpn ipsec security-associations

**Syntax** **show services ipsec-vpn ipsec security-associations**
**<brief | detail | extensive>**
**<service-set *service-set-name*>**

**Release Information** Command introduced before Junos OS Release 7.4.

**Description** (Adaptive services interface only) Display IPsec security associations for the specified service set. If no service set is specified, the security associations for all service sets are displayed.

**Options** **none**—Display standard information about IPsec security associations for all service sets.

**brief | detail | extensive**—(Optional) Display the specified level of output.

**service-set *service-set-name***—(Optional) Display information about a particular service set.

**Required Privilege Level** view

**List of Sample Output**
show services ipsec-vpn ipsec security associations detail on page 1140
show services ipsec-vpn ipsec security associations extensive on page 1140

**Output Fields** Table 78 on page 1138 lists the output fields for the **show services ipsec-vpn ipsec security-associations** command. Output fields are listed in the approximate order in which they appear.

Table 78: show services ipsec-vpn ipsec security-associations Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Service set** | Name of the service set for which the IPsec security associations are defined. If appropriate, includes the outside service interface VRF name. | All levels |
| **Rule** | Name of the rule set applied to the security association. | **detail extensive** |
| **Term** | Name of the IPsec term applied to the security association. | **detail extensive** |
| **Tunnel index** | Numeric identifier of the specific IPsec tunnel for the security association. | **detail extensive** |
| **Anchored PIC** | Services PIC on which the IPsec tunnel is anchored. This field is displayed only if the service set is applied over an AMS interface; for example **ams0**. | **detail**<br>**extensive** |
| **Local gateway** | Gateway address of the local system. | All levels |
| **Remote gateway** | Gateway address of the remote system. | All levels |
| **IPsec inside interface** | Name of the logical interface hosting the IPsec tunnels. | All levels |

Table 78: show services ipsec-vpn ipsec security-associations Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Local identity** | Prefix and port number of the local end. | All levels |
| **Remote identity** | Prefix and port number of the remote end. | All levels |
| **Primary remote gateway** | IP address of the configured primary remote peer. | All levels |
| **Backup remote gateway** | IP address of the configured backup remote peer. | All levels |
| **State** | State of the primary or backup interface: **Active**, **Offline**, or **Standby**. Both ES PICs are initialized to **Offline**. For primary and backup peers, **State** can be **Active** or **Standby**. If both peers are in a state of **Standby**, no connection exists yet between the two peers. | All levels |
| **Failover counter** | Number of times a PIC switched between the primary and backup interfaces, or the number of times the tunnel switched between the primary and remote peers since the software was activated. | All levels |
| **Direction** | Direction of the security association: **inbound** or **outbound**. | All levels |
| **SPI** | Value of the security parameter index. | All levels |
| **AUX-SPI** | Value of the auxiliary security parameter index:<br>• When the value of **Protocol** is **AH** or **ESP**, **AUX-SPI** is always **0**.<br>• When the value of **Protocol** is **AH+ESP**, **AUX-SPI** is always a positive integer. | All levels |
| **Mode** | Mode of the security association:<br>• **transport**—Protects single host-to-host protections.<br>• **tunnel**—Protects connections between security gateways. | **detail extensive** |
| **Type** | Type of security association:<br>• **manual**—Security parameters require no negotiation. They are static, and are configured by the user.<br>• **dynamic**—Security parameters are negotiated by the IKE protocol. Dynamic security associations are not supported in transport mode. | **detail extensive** |
| **State** | Status of the security association:<br>• **Installed**—The security association is installed in the security association database. (For transport mode security associations, the value of State must always be Installed.)<br>• **Not installed**—The security association is not installed in the security association database. | **detail extensive** |

Table 78: show services ipsec-vpn ipsec security-associations Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Protocol** | Protocol supported:<br>• **transport** mode supports Encapsulation Security Protocol (**ESP**) or Authentication Header (**AH**).<br>• **tunnel** mode supports **ESP** or **AH+ESP**. | All levels |
| **Authentication** | Type of authentication used: **hmac-md5-96**, **hmac-sha1-96**, or **none**. | **detail extensive** |
| **Encryption** | Type of encryption algorithm used: **aes-cbc (128 bits)**, **aes-cbc (192 bits)**, **aes-cbc (256 bits)**, **des-cbc**, **3des-cbc**, or **None**. | **detail** |
| **Soft lifetime**<br>**Hard lifetime** | Each lifetime of a security association (SA) has two display options, hard and soft, one of which must be present for a dynamic security association. The hard lifetime specifies the lifetime of the SA. The soft lifetime, which is derived from the hard lifetime, informs the IPsec key management system that the SA is about to expire. This information allows the key management system to negotiate a new SA before the hard lifetime expires.<br>• **Expires in** *seconds* **seconds**—Number of seconds left until the security association expires.<br>• **Expires in** *kilobytes* **kilobytes**—Number of kilobytes left until the security association expires. | **detail extensive** |
| **Anti-replay service** | State of the service that prevents packets from being replayed: **Enabled** or **Disabled**. | **detail extensive** |
| **Replay window size** | Configured size, in packets, of the antireplay service window: **32** or **64**. The antireplay window size protects the receiver against replay attacks by rejecting old or duplicate packets. If the replay window size is **0**, antireplay service is disabled. | **detail** |

## Sample Output

**show services ipsec-vpn ipsec security associations detail**

```
user@host> show services ipsec-vpn ipsec security-associations detail
Service set: huffer, IKE Routing-instance: default

  Rule: _junos_, Term: tunnel1, Tunnel index: 1, Anchored pic: mams-5/1/0
  Local gateway: 4.1.1.2, Remote gateway: 4.1.1.1
  IPSec inside interface: ams0.1, Tunnel MTU: 1500
  Local identity: ipv4(any:0,[0..3]=4.1.1.2)
  Remote identity: ipv4(any:0,[0..3]=4.1.1.1)
```

**show services ipsec-vpn ipsec security associations extensive**

```
user@host> show services ipsec-vpn ipsec security-associations extensive
Service set: snart, IKE Routing-instance: default

  Rule: _junos_, Term: tunnel1, Tunnel index: 1, Anchored pic: mams-5/1/0
  Local gateway: 3.1.100.101, Remote gateway: 3.1.100.2
  IPSec inside interface: ams0.1, Tunnel MTU: 1500
  Local identity: ipv4(any:0,[0..3]=5.1.0.2)
  Remote identity: ipv4(any:0,[0..3]=4.1.0.2)
```

```
Direction: inbound, SPI: 2417504417, AUX-SPI: 0
Mode: tunnel, Type: dynamic, State: Installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: 3des-cbc
Soft lifetime: Expires in 28704 seconds
Hard lifetime: Expires in 28794 seconds
Anti-replay service: Enabled, Replay window size: 128

Direction: outbound, SPI: 4201112312, AUX-SPI: 0
Mode: tunnel, Type: dynamic, State: Installed
Protocol: ESP, Authentication: hmac-sha1-96, Encryption: 3des-cbc
Soft lifetime: Expires in 28704 seconds
Hard lifetime: Expires in 28794 seconds
Anti-replay service: Enabled, Replay window size: 128
```

## show unified-edge ggsn-pgw system interfaces

**Syntax** **show unified-edge ggsn-pgw system interfaces**
**<gateway *gateway*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
**gateway** option introduced in Junos OS Mobility Release 11.4W.

**Description** Display information about the aggregated Packet Forwarding Engine and the aggregated multiservices (AMS) interfaces and their states on one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then information for all GGSNs and P-GWs is displayed.

**Options** **none**—Display information for one or more GGSNs and P-GWs.

**gateway *gateway-name***—(Optional) Display information for the specified gateway.

**Required Privilege Level** view

**Related Documentation**
- show interfaces anchor-group (Aggregated Packet Forwarding Engine) on page 1132
- show interfaces load-balancing (Aggregated Multiservices) on page 1135
- show unified-edge ggsn-pgw resource-manager clients on page 1396
- show unified-edge ggsn-pgw system interfaces service-mode on page 1398

**List of Sample Output** show unified-edge ggsn-pgw system interfaces on page 1143

**Output Fields** Table 79 on page 1142 lists the output fields for the **show unified-edge ggsn-pgw system interfaces** command. Output fields are listed in the approximate order in which they appear.

### Table 79: show unified-edge ggsn-pgw system interfaces

| Field Name | Field Description |
|---|---|
| **Gateway** | Name of the GGSN or P-GW. |
| **Interfaces** | Name of the interface:<br>• Aggregated multiservices; for example, **ams0**<br>• Aggregated Packet Forwarding Engine; for example, **apfe1**<br>• Member of aggregated multiservices; for example, **mams-1/0/0**<br>• Multiservices; for example, **ms-1/0/0**<br>• Packet Forwarding Engine; for example, **pfe-0/1/0** |
| **Members** | For **ams** and **apfe** interfaces, the member interfaces that are part of the aggregated interfaces are displayed. |
| **Operational State** | Indicates whether the interface is operational (**Active**) or not (**Inactive**). |

Table 79: show unified-edge ggsn-pgw system interfaces *(continued)*

| Field Name | Field Description |
|---|---|
| **Redundancy Role** | Redundancy state in which the interface is configured:<br>• **Primary**—The interface is a primary member.<br>• **Secondary**—The interface is a backup to all the primary members.<br>• **Standalone**—The interface has not been configured for redundancy. |

## Sample Output

**show unified-edge ggsn-pgw system interfaces**

```
user@host> show unified-edge ggsn-pgw system interfaces
Gateway: PGW
    Interfaces          Members        Operational     Redundancy
                                          State           Role
    ms-1/0/0                           Active          Standalone
    ms-1/1/0                           Active          Standalone
    ms-2/0/0                           Active          Standalone
    ms-2/1/0                           Active          Standalone
    pfe-0/0/0                          Active          Standalone
    pfe-0/1/0                          Active          Standalone
    pfe-0/2/0                          Active          Standalone
    pfe-0/3/0                          Active          Standalone
```

## show unified-edge sgw system interfaces

**Syntax** **show unified-edge sgw system interfaces**
**<gateway *gateway*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display information about the aggregated Packet Forwarding Engine and the aggregated multiservices (AMS) interfaces and their states on one or more configured Serving Gateways (S-GWs). If a gateway is not specified, then information for all configured S-GWs is displayed.

**Options** **gateway *gateway***—(Optional) Display interface information for the specified gateway.

**Required Privilege Level** view

**Related Documentation**
- show interfaces anchor-group (Aggregated Packet Forwarding Engine) on page 1132
- show interfaces load-balancing (Aggregated Multiservices) on page 1135
- show unified-edge sgw resource-manager clients on page 1406
- show unified-edge sgw system interfaces service-mode on page 1432

**List of Sample Output** show unified-edge sgw system interfaces on page 1145

**Output Fields** Table 80 on page 1144 lists the output fields for the **show unified-edge sgw system interfaces** command. Output fields are listed in the approximate order in which they appear.

Table 80: show unified-edge sgw system interfaces Output Fields

| Field Name | Field Description |
|---|---|
| **Gateway** | Name of the S-GW. |
| **Interfaces** | Name of the interface:<br>• Aggregated multiservices; for example, **ams0**<br>• Aggregated Packet Forwarding Engine, for example, **apfe1**<br>• Member of aggregated multiservices; for example **mams-1/0/0**<br>• Multiservices; for example, **ms-3/0/0**<br>• Packet Forwarding Engine; for example **pfe-4/2/0** |
| **Members** | For **ams** and **apfe** interfaces, the member interfaces that are part of the aggregated interfaces are displayed. |
| **Operational State** | Indicates whether the interface is operational (**Active**) or not (**Inactive**). |

Table 80: show unified-edge sgw system interfaces Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Redundancy Role** | Redundancy state in which the interface is configured:<br>• **Primary**—The interface is a primary member.<br>• **Secondary**—The interface is a backup to all the primary members.<br>• **Standalone**—The interface is not configured for redundancy. |

## Sample Output

**show unified-edge sgw system interfaces**

```
user@host> show unified-edge sgw system interfaces

Gateway: SGW
    Interfaces          Members        Operational     Redundancy
                                          State           Role
    ms-3/0/0                           Active          Standalone
    ms-3/1/0                           Inactive        Standalone
    pfe-4/0/0                          Active          Standalone
    pfe-4/2/0                          Active          Standalone
```

CHAPTER 31

# APN and Related Operational Commands

## clear unified-edge ggsn-pgw statistics

**Syntax** **clear unified-edge ggsn-pgw statistics gateway *gateway***
**<apn *apn*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Clear the statistics for the specified gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW).

**Options** **gateway *gateway***—Clear the statistics for the specified GGSN or P-GW.

**apn *apn***—(Optional) Clear the statistics for the specified access point name (APN).

**Required Privilege Level** clear, unified-edge

**Related Documentation**
- show unified-edge ggsn-pgw statistics on page 1165

**List of Sample Output** clear unified-edge ggsn-pgw statistics gateway pgw on page 1148

**Output Fields** No message is displayed on successful execution of this command; otherwise an error message is displayed.

### Sample Output

**clear unified-edge ggsn-pgw statistics gateway pgw**

```
user@host> clear unified-edge ggsn-pgw statistics gateway pgw
```

## clear unified-edge ggsn-pgw subscribers

**Syntax**

**clear unified-edge ggsn-pgw subscribers gateway** *gateway*
<**ams-interface-name** *ams-interface-name*>
<**apfe-interface-name** *apfe-interface-name*>
<**apn** *apn*>
<**imsi** *imsi*>
<**ms-interface-name** *ms-interface-name*>
<**msisdn** *msisdn*>
<**pfe-interface-name** *pfe-interface-name*>
<**routing-instance** *routing-instance*>
<**v4-addr** *v4-addr*>
<**v6-addr** *v6–addr*>

**Release Information**

Command introduced in Junos OS Mobility Release 11.2W. **ams-interface-name**, **apfe-interface-name**, **ms-interface-name**, and **pfe-interface-name** options introduced in Junos OS Mobility Release 11.4W.

**Description**

Clear the subscribers on the specified gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW).

**Options**

**gateway** *gateway*—Clear the subscribers for the GGSN or P-GW.

**ams-interface-name** *ams-interface-name*—Clear the subscribers on the specified aggregated multiservices interface name.

**apfe-interface-name** *apfe-interface-name*—Clear the subscribers on the specified aggregated Packet Forwarding Engine interface name.

**apn** *apn*—(Optional) Clear the subscribers for the specified APN.

**imsi** *imsi*—(Optional) Clear the subscriber matching the specified International Mobile Subscriber Identity (IMSI).

**ms-interface-name** *ms-interface-name*—Clear the subscribers on the specified multiservices interface name.

**msisdn** *msisdn*—(Optional) Clear the subscriber matching the specified Mobile Station ISDN (MSISDN) number.

**pfe-interface-name** *pfe-interface-name*—Clear the subscribers on the specified Packet Forwarding Engine interface name.

**routing-instance** *routing-instance*—(Optional) Clear the subscriber information for the specified routing instance.

**v4-addr** *v4-addr*—(Optional) Clear the subscriber information for the specified IPv4 address of the subscriber's user equipment (UE).

**v6-addr** *v6-addr*—(Optional) Clear the subscriber information for the specified IPv6 address of the subscriber's user equipment.

**Required Privilege Level** clear, unified-edge

**Related Documentation**
- clear unified-edge ggsn-pgw subscribers charging on page 1151
- clear unified-edge ggsn-pgw subscribers peer on page 1152
- show unified-edge ggsn-pgw subscribers on page 1177

**List of Sample Output** clear unified-edge ggsn-pgw subscribers gateway pgw on page 1150

**Output Fields** No message is displayed on successful execution of this command; otherwise an error message is displayed.

## Sample Output

**clear unified-edge ggsn-pgw subscribers gateway pgw**

```
user@host> clear unified-edge ggsn-pgw subscribers gateway pgw
```

## clear unified-edge ggsn-pgw subscribers charging

**Syntax** **clear unified-edge ggsn-pgw subscribers charging gateway *gateway***
**<charging-profile *charging-profile*>**
**<transport-profile *transport-profile*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Clear the charging information for subscribers on the specified gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW).

**Options**

**gateway *gateway***—Clear the charging information for all subscribers for the specified GGSN or P-GW.

**charging-profile *charging-profile***—(Optional) Clear the subscriber matching the specified charging profile name.

**transport-profile *transport-profile***—(Optional) Clear the subscriber matching the specified transport profile name.

NOTE: You must specify either a charging profile or a transport profile to run this command.

**Required Privilege Level** clear, unified-edge

**Related Documentation**

- clear unified-edge ggsn-pgw subscribers on page 1149
- clear unified-edge ggsn-pgw subscribers peer on page 1152
- show unified-edge ggsn-pgw subscribers on page 1177
- show unified-edge ggsn-pgw subscribers charging on page 1189

**List of Sample Output** clear unified-edge ggsn-pgw subscribers charging gateway pgw on page 1151

**Output Fields** No message is displayed on successful execution of this command; otherwise an error message is displayed.

### Sample Output

**clear unified-edge ggsn-pgw subscribers charging gateway pgw**

```
user@host> clear unified-edge ggsn-pgw subscribers charging gateway pgw
```

## clear unified-edge ggsn-pgw subscribers peer

**Syntax** **clear unified-edge ggsn-pgw subscribers peer gateway** *gateway* **remote-addr** *remote-addr*
**<local-addr** *local-addr***>**
**<routing-instance** *routing-instance***>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Clear the information for subscribers anchored on the specified GPRS tunneling protocol (GTP) peer on the specified gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW). The GTP peer can be a serving GPRS support node (SGSN) or a Serving Gateway (S-GW).

**Options**

**gateway** ***gateway***—Clear the subscribers for the specified GGSN or P-GW.

**remote-addr** ***remote-addr***—Clear the information for subscribers anchored on the peer with the specified IPv4 address.

**local-addr** ***local-addr***—(Optional) Clear the subscriber matching the specified local IPv4 address of the GGSN or P-GW on that interface.

**routing-instance** ***routing-instance***—(Optional) Clear the subscriber matching the specified routing instance.

**Required Privilege Level** clear, unified-edge

**Related Documentation**

- clear unified-edge ggsn-pgw subscribers on page 1149
- clear unified-edge ggsn-pgw subscribers charging on page 1151
- show unified-edge ggsn-pgw subscribers on page 1177

**List of Sample Output** clear unified-edge ggsn-pgw subscribers peer gateway PGW remote-addr 11.11.11.2 on page 1152

**Output Fields** No message is displayed on successful execution of this command; otherwise an error message is displayed.

### Sample Output

**clear unified-edge ggsn-pgw subscribers peer gateway PGW remote-addr 11.11.11.2**

```
user@host> clear unified-edge ggsn-pgw subscribers peer gateway PGW remote-addr 11.11.11.2
```

## show services hcm statistics

**Syntax** **show services hcm statistics**
**<rule *rule-name*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the statistics collected for HTTP header enrichment for a specified tag rule.

NOTE: This command displays an output only if the **count** statement (at the **[edit services hcm tag-rule *rule-name* term *term-name* then]** hierarchy level) is configured for the term in a tag rule.

**Options** **none**—Currently, no statistics are displayed when this command is run without a tag rule specified.

**rule *rule-name***—Display the statistics for the specified tag rule.

**Required Privilege Level** view

**Related Documentation**
- count (HTTP Header Enrichment) on page 738
- Example: Configuring HTTP Header Enrichment on page 146

**List of Sample Output** show services hcm statistics rule rule1 on page 1153

**Output Fields** Table 81 on page 1153 lists the output fields for the **show services hcm statistics** command. Output fields are listed in the approximate order in which they appear.

### Table 81: show services hcm statistics Output Fields

| Field Name | Field Description |
|---|---|
| **Interface** | Name of the interface for which the statistics are displayed. |
| **Term ID** | Identifier for the term (in the tag rule) for which the statistics are displayed. |
| **Hits** | Number of times that the term was matched. This field displays the aggregate number of hits on service sets that include the term. |

## Sample Output

**show services hcm statistics rule rule1**

```
user@host> show services hcm statistics rule rule1
Interface: mams-3/1/0
Term id              Hits
1                    58
Interface: mams-4/1/0
```

```
Term id              Hits
1                   144
```

## show unified-edge ggsn-pgw apn service-mode

**Syntax** **show unified-edge ggsn-pgw apn service-mode**
**<apn-name *apn-name*>**
**<brief | detail>**
**<gateway *gateway*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Display the service mode information for an access point name (APN) for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If an APN is not specified, then the information for all APNs for one or more GGSNs or P-GWs is displayed.

**Options** **none**—(Same as brief) Display the APN service mode information in brief.

**apn-name *apn-name***—(Optional) Display the service mode information for the specified APN.

**brief | detail**—(Optional) Display the specified level of output.

**gateway *gateway***—(Optional) Display the service mode information for the specified GGSN or P-GW.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge ggsn-pgw service-mode on page 1163

**List of Sample Output**
show unified-edge ggsn-pgw apn service-mode brief on page 1156
show unified-edge ggsn-pgw apn service-mode detail on page 1156

**Output Fields** Table 82 on page 1155 lists the output fields for the **show unified-edge ggsn-pgw apn service-mode** command. Output fields are listed in the approximate order in which they appear.

### Table 82: show unified-edge ggsn-pgw apn service-mode Output Fields

| Field Name | Field Description |
|---|---|
| **APN Name** | Name of the APN. |
| **Service Mode** | Service mode for the APN:<br>• **Operational**—APN is in operational mode.<br>• **Maintenance**—APN is in maintenance mode. |

## Sample Output

**show unified-edge ggsn-pgw apn service-mode brief**

```
user@host> show unified-edge ggsn-pgw apn service-mode brief
Maintenance Mode
    MM Active Phase - System is ready to accept configuration changes for all
                      attributes of this object and its sub-hierarchies.
    MM In/Out Phase - System is ready to accept configuration changes only for
                      non-maintenance mode attributes of this object and
                      its sub-hierarchies.

APN Name                        Gateway Name                    Service Mode

jnpr-sunnyvale                  PGW                             Operational
jnpr-toxin                      PGW                             Operational
zoo                             PGW1                            Maintenance -
Active Phase
```

**show unified-edge ggsn-pgw apn service-mode detail**

```
user@host> show unified-edge ggsn-pgw apn service-mode detail
Gateway: PGW
APN Name        : jnpr-sunnyvale
Service Mode    : Operational

APN Name        : jnpr-toxin
Service Mode    : Operational
Gateway: PGW1

APN Name        : zoo
Service Mode    : Maintenance - Active Phase
```

## show unified-edge ggsn-pgw apn statistics

**Syntax** **show unified-edge ggsn-pgw apn statistics apn-name *apn-name* <gateway *gateway*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Display the statistics for the specified access point name (APN) on one or more Gateway GPRS Support Nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then the statistics for the specified APN on all GGSNs and P-GWs are displayed.

**Options** **apn-name *apn-name***—Display the statistics for the specified APN.

**gateway *gateway***—(Optional) Display the statistics for the APN on the specified GGSN or P-GW.

**Required Privilege Level** view

**List of Sample Output** show unified-edge ggsn-pgw apn statistics apn-name apn-1 on page 1161
show unified-edge ggsn-pgw apn statistics apn-name virtual-1 on page 1162

**Output Fields** Table 83 on page 1157 lists the output fields for the **show unified-edge ggsn-pgw apn statistics** command. Output fields are listed in the approximate order in which they appear.

### Table 83: show unified-edge ggsn-pgw apn statistics Output Fields

| Field Name | Field Description |
|---|---|
| **Gateway** | Name of the GGSN or P-GW. |
| Control Plane APN Statistics | |
| **Session establishment attempts** | Number of attempted session establishments. |
| **Successful session establishments** | Number of successful session establishments. |
| **MS/peer initiated session deactivations** | Number of attempted deactivations initiated by the mobile station (MS) or the GTP peer. |
| **Successful MS/peer initiated deactivations** | Number of deactivations initiated by the MS or GTP peer that were successful. |
| **Gateway initiated session deactivations** | Number of attempted deactivations initiated by the broadband gateway. |

Table 83: show unified-edge ggsn-pgw apn statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Successful gateway initiated deactivations** | Number of deactivations initiated by the broadband gateway that were successful. |
| **MS initiated modification attempts** | Number of attempted session or bearer modifications initiated by the MS or user equipment (UE). |
| **Successful MS initiated modifications** | Number of session or bearer modifications initiated by the MS or user equipment that were successful. |
| **PGW/GGSN initiated modification attempts** | Number of attempted session or bearer modifications initiated by the GGSN or P-GW. |
| **Successful PGW/GGSN initiated modifications** | Number of session or bearer modifications initiated by the GGSN or the P-GW that were successful. |
| **Redirected session activations** | Number of session activations that were redirected to a different gateway. |
| **Successful redirected session activations** | Number of session activations that were successfully redirected to a different gateway. |
| **User authentication statistics** | The following statistics related to user authentication are displayed:<br>• **Authentication failures**—Number of authentication failures.<br>• **Attempted authentications**—Number of attempted authentications.<br>• **Successful authentications**—Number of successful authentications. |
| **Address allocation statistics** | The following statistics related to address allocation are displayed:<br>• **dynamic IP allocation attempts**—Number of attempted dynamic IP allocations.<br>• **dynamic IP allocation success**—Number of successful dynamic IP allocations. |
| **Charging statistics** | The following statistics related to charging are displayed:<br>• **Number of CDRs allocated**—Total number of Charging Data Records (CDRs) opened.<br>• **Number of partial CDRs allocated**—Total number of partial CDRs opened.<br>• **Number of CDRs closed**—Total number of CDRs closed.<br>• **Number of containers closed**—Total number of containers closed. |

Table 83: show unified-edge ggsn-pgw apn statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Session Establishments Failed (by GTP cause)** | Number of session establishments that failed, listed according to the following GTP cause codes (returned in the GTP Response message):<br>• **Others**<br>• **Service unavailable**<br>• **System failure**<br>• **No resources**<br>• **No address**<br>• **Service denied**<br>• **Authentication Fail**<br>• **APN access denied** |
| Data plane statistics | |
| **Total packets violating MIF ACL** | Total number of packets violating the mobile interface access control list (ACL) filters. |
| **Total accepted mobile-to-mobile packets** | Total number of mobile-to-mobile traffic packets accepted by the GGSN or P-GW. |
| **Total accepted mobile-to-mobile bytes** | Total number of octets of mobile-to-mobile traffic packets accepted by the GGSN or P-GW. |
| **Total dropped mobile-to-mobile packets** | Total number of mobile-to-mobile traffic packets dropped by the GGSN or P-GW. |
| **Total dropped mobile-to-mobile bytes** | Total number of octets of mobile-to-mobile traffic packets dropped by the GGSN or P-GW. |
| **Total redirected mobile-to-mobile packets** | Total number of mobile-to-mobile traffic packets redirected by the GGSN or P-GW. |
| **Total redirected mobile-to-mobile bytes** | Total number of octets of mobile-to-mobile traffic packets redirected by the GGSN or P-GW. |
| Miscellaneous Packet Statistics | |
| **IPv6 Router Solicitations received** | Number of IPv6 router solicitations received by the APN on the broadband gateway. |
| **IPv6 Router Advertisement transmitted** | Number of IPv6 router advertisements transmitted by the APN on the broadband gateway. |

Table 83: show unified-edge ggsn-pgw apn statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **IPv6 Neighbor Solicitations received** | Number of IPv6 neighbor solicitations received by the APN on the broadband gateway. |
| **IPv6 Neighbor Advertisement transmitted** | Number of IPv6 neighbor advertisements transmitted by the APN on the broadband gateway. |
| Data plane GTP statistics (Gn/S5/S8) | |
| **Input packets** | Number of incoming GTP data packets on the Gn, Gp, S5, and S8 interfaces. |
| **Input bytes** | Number of octets of incoming GTP data packets on the Gn, Gp, S5, and S8 interfaces. |
| **Output packets** | Number of outgoing GTP data packets on the Gn, Gp, S5, and S8 interfaces. |
| **Output bytes** | Number of octets of outgoing GTP data packets on the Gn, Gp, S5, and S8 interfaces. |
| **Discarded packets** | Number of discarded GTP data packets on the Gn, Gp, S5, and S8 interfaces. |
| Data plane GTP statistics (Gi) | |
| **Input packets** | Number of incoming GTP data packets on the Gi interface. |
| **Input bytes** | Number of octets of incoming GTP data packets on the Gi interface. |
| **Output packets** | Number of outgoing GTP data packets on the Gi interface. |
| **Output bytes** | Number of octets of outgoing GTP data packets on the Gi interface. |
| **Discarded packets** | Number of discarded GTP data packets on the Gi interface. |
| **Virtual APN Statistics**<br>NOTE: This information is displayed only for APN types **virtual** or **virtual-pre-authenticate**. | |
| **Session establishment attempts** | Number of attempted session establishments. |
| **Redirect Successful** | Number of session activations (for APN type **virtual** or **virtual-pre-authenticate**) that were successfully redirected to a real APN. |
| **Redirect Failures due to Authentication Fail** | Number of session redirects that were unsuccessful because of authentication failure. Authentication failures can refer to cases when the real APN sent by the authentication, authorization, and accounting (AAA) server is not administratively “up” on the gateway, or if the virtual APN is not administratively “up” on the gateway. |

Table 83: show unified-edge ggsn-pgw apn statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Redirect Failures due to APN access denied** | Number of session redirects that were unsuccessful because access to the redirected APN was denied. |
| **Redirected session activations** | Number of session activations that were redirected to a different gateway. |
| **Successful redirected session activations** | Number of session activations that were successfully redirected to a different gateway. |

## Sample Output

**show unified-edge ggsn-pgw apn statistics apn-name apn-1**

```
user@host> show unified-edge ggsn-pgw apn statistics apn-name apn-1
Gateway: gw1
Control plane APN statistics:
    Session establishment attempts:             55
    Successful session establishments:          55
    MS/peer initiated session deactivations:    55
    Successful MS/peer initiated deactivations: 55
    Gateway initiated session deactivations:    0
    Successful gateway initiated deactivations: 0
    MS initiated modification attempts:         34
    Successful MS initiated modifications:      34
    PGW/GGSN initiated modification attempts:   0
    Successful PGW/GGSN initiated modifications:0
    Redirected session activations:             0
    Successful redirected session activations:  0
    User authentication statistics:
         Authentication failures:               0
         Attempted authentications:             0
         Successful authentications:            0
    Address allocation statistics:
         dynamic IP allocation attempts:        55
         dynamic IP allocation success:         55
    Charging statistics:
         Number of CDRs allocated:              120
         Number of partial CDRs allocated:      0
         Number of CDRs closed:                 60
         Number of containers closed            0
    Session Establishments Failed (by GTP cause):
        Others              0
        Service unavailable: 0
        System failure:     0
        No resources:       0
        No address:         0
        Service denied:     0
        Authentication Fail: 0
        APN access denied:  0
Data plane statistics:
    Total packets violating MIF ACL:            0
    Total accepted mobile-to-mobile packets:    0
    Total accepted mobile-to-mobile bytes:      0
```

```
Miscellaneous Packet statistics:
    IPv6 Router Solicitations received:         0
    IPv6 Router Advertisement transmitted:      0
    IPv6 Neighbor Solicitations received:       0
    IPv6 Neighbor Advertisement transmitted:    0
Data plane GTP statistics (Gn/S5/S8):
    Input     packets:          10
    Input     bytes:            1000
    Output    packets:          10
    Output    bytes:            1168
    Discarded packets:          0
Data plane GTP statistics (Gi):
    Input     packets:          10
    Input     bytes:            1168
    Output    packets:          10
    Output    bytes:            1000
    Discarded packets:          0
```

### show unified-edge ggsn-pgw apn statistics apn-name virtual-1

```
user@host> show unified-edge ggsn-pgw apn statistics apn-name virtual-1
Gateway: PGW
Virtual APN Statistics:
    Session Establishment Attempts               : 4
    Redirect Successful                          : 1
    Redirect Failures due to APN access denied   : 1
    Redirect Failures due to Authentication Fail : 1
    Redirected session activations:                1
    Successful redirected session activations:     1
```

## show unified-edge ggsn-pgw service-mode

**Syntax** **show unified-edge ggsn-pgw service-mode**
**<brief | detail>**
**<gateway *gateway-name*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Display the service mode information for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then the service mode information for all the GGSNs and P-GWs is displayed.

**Options** **none**—(Same as brief) Display the service mode information in brief.

**brief | detail** —(Optional) Display the specified level of output.

**gateway *gateway-name***—(Optional) Display service mode information for the specified GGSN or P-GW.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge ggsn-pgw apn service-mode on page 1155

**List of Sample Output**
show unified-edge ggsn-pgw service-mode brief on page 1163
show unified-edge ggsn-pgw service-mode detail on page 1164

**Output Fields** Table 84 on page 1163 lists the output fields for the **show unified-edge ggsn-pgw service-mode** command. Output fields are listed in the approximate order in which they appear.

### Table 84: show unified-edge ggsn-pgw service-mode Output Fields

| Field Name | Field Description |
|---|---|
| **Gateway Name** | Name of the GGSN or P-GW. |
| **Service Mode** | Service mode for the gateway:<br>• **Operational**—Gateway is in operational mode.<br>• **Maintenance**—Gateway is in maintenance mode. |

## Sample Output

**show unified-edge ggsn-pgw service-mode brief**

```
user@host> show unified-edge ggsn-pgw service-mode brief
Maintenance Mode
    MM Active Phase - System is ready to accept configuration changes for all
                      attributes of this object and its sub-hierarchies.
    MM In/Out Phase - System is ready to accept configuration changes only for
                      non-maintenance mode attributes of this object and
                      its sub-hierarchies.
```

```
Gateway Name                    Service Mode

PGW                             Operational
PGW2                            Operational
```

**show unified-edge ggsn-pgw service-mode detail**

```
user@host> show unified-edge ggsn-pgw service-mode detail
Service Mode Status
Gateway Name    : PGW
Service Mode    : Operational
Service Mode Status
Gateway Name    : PGW2
Service Mode    : Operational
```

## show unified-edge ggsn-pgw statistics

**Syntax** **show unified-edge ggsn-pgw statistics**
<apn *apn*>
<gateway *gateway*>
<gtpv1-arp *gtpv1-arp*>
<gtpv2-priority-level *gtpv2-priority-level*>
<qci *qci*>

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Display the statistics for one or more Gateway GPRS Support Nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then statistics for all GGSNs and P-GWs are displayed.

**Options**

**apn *apn***—(Optional) Display the statistics for the specified APN on one or more GGSNs or P-GWs.

**gateway *gateway***—(Optional) Display the statistics for the specified GGSN or P-GW.

**gtpv1-arp *gtpv1-arp***—(Optional) Display the statistics for the specified GTPv1 allocation and retention priority (ARP) on one or more gateways. You can specify an ARP value of 1 through 3.

**gtpv2-priority-level *gtpv2-priority-level***—(Optional) Display the statistics for the specified GTPv2 priority level on one or more gateways. You can specify a priority level of 1 through 15.

**qci *qci***—(Optional) Display the statistics for the specified QoS Class Identifier (QCI) on one or more gateways. You can specify a QCI of 1 through 9.

**Required Privilege Level** view

**Related Documentation**

- clear unified-edge ggsn-pgw statistics on page 1148
- show unified-edge ggsn-pgw statistics traffic-class on page 1264

**List of Sample Output** show unified-edge ggsn-pgw statistics on page 1167

**Output Fields** Table 85 on page 1165 lists the output fields for the **show unified-edge ggsn-pgw statistics** command. Output fields are listed in the approximate order in which they appear.

### Table 85: show unified-edge ggsn-pgw statistics Output Fields

| Field Name | Field Description |
|---|---|
| **Gateway** | Name of the GGSN or P-GW. |
| Control Plane Statistics | |

Table 85: show unified-edge ggsn-pgw statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Session establishment attempts** | Number of attempted session establishments. |
| **Successful session establishments** | Number of successful session establishments. |
| **MS/peer initiated session deactivations** | Number of attempted deactivations initiated by the mobile station (MS) or GPRS tunneling protocol (GTP) peer. |
| **Successful MS/peer initiated deactivations** | Number of deactivations initiated by the MS or GTP peer that were successful. |
| **Gateway initiated session deactivations** | Number of attempted deactivations initiated by the broadband gateway. |
| **Successful gateway initiated deactivations** | Number of deactivations initiated by the broadband gateway that were successful. |
| Data Plane Global statistics | |
| **Source address violation packets** | Number of packets with an incorrect source address. |
| **Source address violation bytes** | Number of octets with an incorrect source address. |
| **Non-existent TEID/TID packets** | Total number of packets received with nonexistent tunnel endpoint identifiers (TEIDs) or tunnel identifiers (TIDs). |
| **GTP length error packets** | Number of GTP packets with an incorrect length in the IP or UDP header. |
| **Non-existent UE address packets** | Number of packets received by the broadband gateway for which the IP address (IPv4 or IPv6) did not match the IP address of existing subscribers on the gateway |
| Data Plane GTP Statistics (Gn/S5/S8) | |
| **Input packets** | Number of incoming GTP data packets on the Gn, Gp, S5, and S8 interfaces. |
| **Input bytes** | Number of octets of incoming GTP data packets on the Gn, Gp, S5, and S8 interfaces. |
| **Output packets** | Number of outgoing GTP data packets on the Gn, Gp, S5, and S8 interfaces. |

Table 85: show unified-edge ggsn-pgw statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Output bytes** | Number of octets of outgoing GTP data packets on the Gn, Gp, S5, and S8 interfaces. |
| **Discarded packets** | Number of discarded GTP data packets on the Gn, Gp, S5, and S8 interfaces. |
| Data Plane GTP statistics (Gi) | |
| **Input packets** | Number of incoming GTP data packets on the Gi interface. |
| **Input bytes** | Number of octets of incoming GTP data packets on the Gi interface. |
| **Output packets** | Number of outgoing GTP data packets on the Gi interface. |
| **Output bytes** | Number of octets of outgoing GTP data packets on the Gi interface. |
| **Discarded packets** | Number of discarded GTP data packets on the Gi interface. |

## Sample Output

**show unified-edge ggsn-pgw statistics**

```
user@host> show unified-edge ggsn-pgw statistics
Control plane statistics:
    Session establishment attempts:             187501
    Successful session establishments:          187501
    MS/peer initiated session deactivations:    46878
    Successful MS/peer initiated deactivations: 46878
    Gateway initiated session deactivations:    0
    Successful gateway initiated deactivations: 0
Data plane global statistics:
    Source address violation packets:                   0
    Source address violation bytes:                     0
    Non-existent TEID/TID packets:                      0
    GTP length error packets:                           0
    Non-existent UE address packets:                    0
Data plane GTP statistics (Gn/S5/S8):
    Input     packets:          2999505
    Input     bytes:            2111435520
    Output    packets:          221199
    Output    bytes:            14156736
    Discarded packets:          0
Data plane GTP statistics (Gi):
    Input     packets:          221199
    Input     bytes:            14156736
    Output    packets:          2999505
    Output    bytes:            2111435520
    Discarded packets:          0
```

## show unified-edge ggsn-pgw status

**Syntax** **show unified-edge ggsn-pgw status**
**<apn-name *apn-name*>**
**<brief | detail>**
**<fpc-slot *fpc-slot*>**
**<gateway *gateway*>**
**<gtpv1-arp *gtpv1-arp*>**
**<gtpv2-priority-level *gtpv2-priority-level*>**
**<pic-slot *pic-slot*>**
<pdn-type>
**<qci *qci*>**
**<rat-type (eutran | gan | geran | hspa | others | utran | wlan)>**
**<traffic-class (background | conversational | interactive | streaming)>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W. **extensive** and **pdn-type** options introduced in Junos OS Mobility Release 11.4W.

**Description** Display the status information, such as the number of subscribers, active sessions, and so on, for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then status information for all GGSNs and P-GWs is displayed.

**Options** **none**—(Same as brief) Display the status information in brief.

**apn-name *apn-name***—(Optional) Display the status information for the specified access point name (APN).

**brief | detail | extensive**—(Optional) Display the specified level of output.

**fpc-slot *fpc-slot***—(Optional) Display the status information for the specified FPC slot number.

**gateway *gateway***—(Optional) Display the status information for the specified GGSN or P-GW.

**gtpv1-arp *gtpv1-arp***—(Optional) Display the status information for the GTPv1 Allocation and Retention Priority (ARP) value specified. You can specify a GTPv1 ARP value of 1 through 3.

**gtpv2-priority-level *gtpv2-priority-level***—(Optional) Display the status information for the GTPv2 priority specified. You can specify a priority of 1 through 15.

**pdn-type**—(Optional) Display the number of active sessions according to the type of Packet Data Network (PDN): IPv4, IPv6, and both IPv4 and IPv6.

**pic-slot *pic-slot***—(Optional) Display the status information for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**qci *qci***—(Optional) Display the status information for the specified QoS Class Identifier (QCI). You can specify a QCI of 1 through 9.

**rat-type (eutran | gan | geran | hspa | others | utran | wlan)**—(Optional) Display the status information for the specified Radio Access Technology (RAT).

**traffic-class (background | conversational | interactive | streaming)**—(Optional) Display the status information for the specified traffic class.

**Required Privilege Level** view

**Related Documentation**

- show unified-edge ggsn-pgw status gtp-peer on page 1173
- show unified-edge ggsn-pgw status preemption-list on page 1266
- show unified-edge ggsn-pgw status session-state on page 1175

**List of Sample Output**

show unified-edge ggsn-pgw status on page 1170
show unified-edge ggsn-pgw status detail on page 1170
show unified-edge ggsn-pgw status detail on page 1171
show unified-edge ggsn-pgw status extensive on page 1171
show unified-edge ggsn-pgw status pdn-type detail on page 1171

**Output Fields** Table 86 on page 1169 lists the output fields for the **show unified-edge ggsn-pgw status** command. Output fields are listed in the approximate order in which they appear.

Table 86: show unified-edge ggsn-pgw status Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the GGSN or P-GW. | All levels<br>none |
| **FPC SLOT** | FPC slot number of the interface for which the status information is displayed. | **detail** |
| **PIC SLOT** | PIC slot number of the FPC for which the status information is displayed. | **detail** |
| **State** | State of the services or session PIC on the GGSN or P-GW:<br>• **Standalone**<br>• **Active**—PIC is an active member.<br>• **Backup**—PIC is a backup. | **detail** |
| **Type** | Indicates whether the PIC is a session PIC or a services PIC. | **detail** |
| **Active Subscribers** | Number of active subscribers. | All levels<br>none |
| **Active Subscribers (with services)** | Number of active subscribers who are using subscriber-aware services and who are anchored on a services PIC. | |
| **Active Sessions** | Number of active sessions. | All levels<br>none |

Table 86: show unified-edge ggsn-pgw status Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Active Bearers** | Number of active bearers or Packet Data Protocol (PDP) contexts. | All levels<br>none |
| **CPU Load (%)** | Percentage of the CPU load. | All levels<br>none |
| **Memory Load (%)** | Percentage of the memory load. | All levels<br>none |
| **Connections to Session PICs** | Connections between the services PIC and the session PICs.<br>This field is displayed only when the services PIC has a connection to one or more session PICs. | extensive |
| **IPv4 Active Sessions** | Number of active IPv4 sessions. | **pdn-type** |
| IPv6 Active Sessions | Number of active IPv6 sessions. | **pdn-type** |
| IPv4-v6 Active Sessions | Number of active IPv4-IPv6 sessions. | **pdn-type** |

## Sample Output

**show unified-edge ggsn-pgw status**

```
user@host> show unified-edge ggsn-pgw status
Gateway: PGW
    Active Subscribers                 :              3
    Active Subscribers (with services)  :              0
    Active Sessions                    :              3
    Active Bearers                     :              3
    CPU Load (%)                       :              0
    Memory Load (%)                    :              55
```

**show unified-edge ggsn-pgw status detail**

```
user@host> show unified-edge ggsn-pgw status detail
Gateway: PGW
    FPC SLOT: 4    PIC SLOT: 0
    State                              :              Standalone
    Type                               :              Session-PIC
    Active Subscribers                 :              3
    Active Sessions                    :              3
    Active Bearers                     :              3
    CPU Load (%)                       :              0
    Memory Load (%)                    :              55
    FPC SLOT: 4    PIC SLOT: 1
    State                              :              Standalone
    Type                               :              Session-PIC
    Active Subscribers                 :              0
    Active Sessions                    :              0
    Active Bearers                     :              0
```

```
    CPU Load (%)                        :               0
    Memory Load (%)                     :               55
```

### show unified-edge ggsn-pgw status detail

```
user@host> show unified-edge ggsn-pgw status detail
Gateway: PGW
    FPC SLOT: 4    PIC SLOT: 0
    State                               :               Standalone
    Type                                :               Session-PIC
    Active Subscribers                  :               3
    Active Sessions                     :               3
    Active Bearers                      :               3
    CPU Load (%)                        :               0
    Memory Load (%)                     :               55
    FPC SLOT: 4    PIC SLOT: 1
    State                               :               Standalone
    Type                                :               Session-PIC
    Active Subscribers                  :               0
    Active Sessions                     :               0
    Active Bearers                      :               0
    CPU Load (%)                        :               0
    Memory Load (%)                     :               55
```

### show unified-edge ggsn-pgw status extensive

```
user@host> show unified-edge ggsn-pgw status extensive
Gateway: PGW

    FPC SLOT: 1   PIC SLOT: 0
    State                               :             Active
    Type                                :             Service-PIC
    Active Subscribers                  :             0
    Active Sessions                     :             0
    CPU Load (%)                        :             0
    Memory Load (%)                     :             22
    Connections to Session PICs         :
                                                      ms-2/0

    FPC SLOT: 2   PIC SLOT: 0
    State                               :             Active
    Type                                :             Session-PIC
    Active Subscribers                  :             0
    Active Sessions                     :             0
    Active Bearers                      :             0
    CPU Load (%)                        :             0
    Memory Load (%)                     :             29
```

### show unified-edge ggsn-pgw status pdn-type detail

```
user@host> show unified-edge ggsn-pgw status pdn-type detail
Gateway: PGW
    FPC SLOT: 4    PIC SLOT: 0
    State                               :               Standalone
    Type                                :               Session-PIC
    IPv4 Active Sessions                :           3
    IPv6 Active Sessions                :           0
    IPv4-v6 Active Sessions             :           0
    FPC SLOT: 4    PIC SLOT: 1
    State                               :               Standalone
    Type                                :               Session-PIC
```

```
IPv4 Active Sessions                :           0
IPv6 Active Sessions                :           0
IPv4-v6 Active Sessions             :           0
```

## show unified-edge ggsn-pgw status gtp-peer

**Syntax** **show unified-edge ggsn-pgw status gtp-peer remote-address** *remote-address*
<**fpc-slot** *fpc-slot*>
<**gateway** *gateway*>
<**local-address** *local-address*>
<**pic-slot** *pic-slot*>
<**routing-instance** *name*>

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Displays the count of the bearer distribution across multiple Packet Forwarding Engines for the specified GTP peer on one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then information for all GGSNs and P-GWs is displayed.

**Options**

**remote-address** *remote-address*—Display the information for the GTP peer with the specified remote address.

**fpc-slot** *fpc-slot*—(Optional) Display the information for the specified FPC slot number pertaining to the session PIC.

**gateway** *gateway*—(Optional) Display the information for the specified GGSN or P-GW.

**local-address** *local-address*—(Optional) Display the information for the local address of the specified peer on the gateway.

**pic-slot** *pic-slot*—(Optional) Display the information for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**routing-instance** *routing-instance*—(Optional) Display the information for the peer on the specified routing instance ID.

**Required Privilege Level** unified-edge, view

**Related Documentation**

- show unified-edge ggsn-pgw status on page 1168

**List of Sample Output** show unified-edge ggsn-pgw status gtp-peer remote-address 200.6.1.2 on page 1174

**Output Fields** Table 87 on page 1173 lists the output fields for the **show unified-edge ggsn-pgw status gtp-peer** command. Output fields are listed in the approximate order in which they appear.

Table 87: show unified-edge ggsn-pgw status gtp-peer Output Fields

| Field Name | Field Description |
|---|---|
| **Gateway** | Name of the GGSN or P-GW. |
| **FPC-slot/PIC-slot** | FPC and PIC slot numbers of the aggregated Packet Forwarding Engine interface for which the information is displayed. |

Table 87: show unified-edge ggsn-pgw status gtp-peer Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Number of bearers** | Number of bearers on the corresponding FCP and PIC slot. |

## Sample Output

**show unified-edge ggsn-pgw status gtp-peer remote-address 200.6.1.2**

```
user@host> show unified-edge ggsn-pgw status gtp-peer remote-address 200.6.1.2
Gateway: PGW
    FPC-slot/PIC-slot            Number of bearers
    ---------------------------------------------
           0/0                           1
           0/1                           0
```

## show unified-edge ggsn-pgw status session-state

**Syntax** **show unified-edge ggsn-pgw status session-state**
**<brief | detail>**
**<fpc-slot *fpc-slot*>**
**<gateway *gateway*>**
**<pic-slot *pic-slot*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the session state information of subscribers anchored on one or more Gateway GPRS Support Nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a gateway name is not specified, then the session state information for all the GGSN or P-GWs is displayed.

**Options** **none**—(Same as brief) Display the session state information in brief.

**brief | detail** —(Optional) Display the specified level of output.

**fpc-slot *fpc-slot* pic-slot *pic-slot***—(Optional) Display the session state information for the PIC in the specified FPC and PIC slot numbers.

**gateway *gateway***—(Optional) Display the session state information for the specified gateway name.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge ggsn-pgw status on page 1168

**List of Sample Output**
show unified-edge ggsn-pgw status session-state brief on page 1176
show unified-edge ggsn-pgw status session-state detail on page 1176

**Output Fields** Table 88 on page 1175 lists the output fields for the **show unified-edge ggsn-pgw status session-state** command. Output fields are listed in the approximate order in which they appear.

### Table 88: show unified-edge ggsn-pgw status session-state Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the GGSN or P-GW. | All levels<br>none |
| **FPC Slot** | FPC slot number of the interface for which the session state information is displayed. | **detail** |
| **PIC Slot** | PIC slot number of the FPC for which the session state information is displayed. | **detail** |

Table 88: show unified-edge ggsn-pgw status session-state Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Established** | Number of sessions established. | All levels<br>none |
| **Deleting** | Number of sessions being deleted. | All levels<br>none |
| **Updating bearer** | Number of sessions for which the bearers or PDP contexts are being updated. | All levels<br>none |
| **Authorizing** | Number of sessions waiting for initial authorization. | All levels<br>none |
| **Acquiring address** | Number of sessions for which the IP address is being acquired. | All levels<br>none |

## Sample Output

**show unified-edge ggsn-pgw status session-state brief**

```
user@host> show unified-edge ggsn-pgw status session-state brief
Gateway: PGW
    Established          :              1
    Deleting             :              0
    Updating bearer      :              0
    Authorizing          :              0
    Acquiring address    :              0
```

**show unified-edge ggsn-pgw status session-state detail**

```
user@host> show unified-edge ggsn-pgw session-state detail
Gateway: PGW
    Mobile gateway status of fpc slot: 2  pic slot: 1
    Established          :              1
    Deleting             :              0
    Updating bearer      :              0
    Authorizing          :              0
    Acquiring address    :              0

    Mobile gateway status of fpc slot: 5  pic slot: 1
    Established          :              1
    Deleting             :              0
    Updating bearer      :              0
    Authorizing          :              0
    Acquiring address    :              0
```

## show unified-edge ggsn-pgw subscribers

**Syntax** **show unified-edge ggsn-pgw subscribers**
**<apn *apn-name*>**
**<brief | detail | extensive>**
**<fpc-slot *fpc-slot*>**
**<gateway *gateway*>**
**<gtp-version *gtp-version*>**
**<gtpv1-arp *gtpv1-arp*>**
**<gtpv2-priority-level *gtpv2-priority-level*>**
**<imsi *imsi*>**
**<msisdn *msisdn*>**
<pdn-type (ipv4 | ipv4-v6 | ipv6)>
**<peer *peer*>**
**<pic-slot *pic-slot*>**
**<qci *qci*>**
<roaming-status (home | roamer | visitor)>
**<routing-instance *routing-instance*>**
<services *service-name*>
**<session-state (acquire-address | authorizing | bearer-update | deleting | established)>**
**<v4-addr *v4-addr*>**
**<v6-addr *v6–addr*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
Support for the **services** and **pdn-type** attributes introduced in Junos OS Mobility Release 11.4W.

**Description** Display the subscriber information one or more Gateway GPRS Support Nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then subscriber information for all GGSNs and P-GWs is displayed.

**Options** **none**—(Same as brief) Display the subscriber information in brief.

**apn *apn-name***—(Optional) Display the subscriber information for the specified access point name (APN).

**brief | detail | extensive** —(Optional) Display the specified level of output.

**fpc-slot *fpc-slot***—(Optional) Display the subscriber information for the specified FPC slot number.

**gateway *gateway***—(Optional) Display the subscriber information for the specified gateway.

**gtp-version *gtp-version***—(Optional) Display the subscriber information for the GTP version number (0 through 2) specified.

**gtpv1-arp *gtpv1-arp***—(Optional) Display the subscriber information for the GTPv1 Allocation and Retention Priority (ARP) value specified. You can specify a GTPv1 ARP value of 1 through 3.

**gtpv2-priority-level *gtpv2-priority-level***—(Optional) Display the subscriber information for the GTPv2 priority specified. You can specify a priority of 1 through 15.

**imsi** *imsi*—(Optional) Display the subscriber information for the specified International Mobile Subscriber Identity (IMSI).

**msisdn** *msisdn*—(Optional) Display the subscriber information for the specified mobile station ISDN (MSISDN) number.

**pdn-type (ipv4 | ipv4-v6 | ipv6)**—(Optional) Display the subscriber information for the specified Packet Data Network (PDN) type or session type. You can specify the following PDN or session types:

- **ipv4**—Subscribers with only IPv4 sessions.
- **ipv4-v6**—Subscribers with both IPv4 and IPv6 sessions.
- **ipv6**—Subscribers with only IPv6 sessions.

**peer** *peer*—(Optional) Display the subscriber information for the specified peer IP address.

**pic-slot** *pic-slot*—(Optional) Display the subscriber information for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**qci** *qci*—(Optional) Display the subscriber information for the specified QoS Class Identifier (QCI).

**roaming-status (home | roamer | visitor)**—(Optional) Display the subscriber information for the specified roaming status.

**routing-instance** *routing-instance*—(Optional) Display the subscriber information for the specified routing instance.

**services** *service-name*—(Optional) Display the information for subscribers who are using the specified subscriber-aware service and who are anchored on a services PIC. Currently, HTTP Content Management **hcm** is the only service supported.

**session-state (acquire-address | authorizing | bearer-update | deleting | established)**—(Optional) Display the subscriber information for the specified session state. You can specify the following session states:

- **acquire-address**—Sessions for which the IP address is being acquired.
- **authorizing**—Sessions waiting for initial authorization.
- **bearer-update**—Sessions which are being updated.
- **deleting**—Sessions being deleted.
- **established**—Sessions already established.

**v4-addr** *v4-addr*—(Optional) Display the subscriber information for the specified IPv4 address of the subscriber's user equipment (UE).

**v6-addr** *v6-addr*—(Optional) Display the subscriber information for the specified IPv6 address of the subscriber's user equipment.

**Required Privilege Level** view

**Related Documentation**
- clear unified-edge ggsn-pgw subscribers on page 1149
- show unified-edge ggsn-pgw subscribers charging on page 1189
- show unified-edge ggsn-pgw subscribers traffic-class on page 1269

**List of Sample Output**
show unified-edge ggsn-pgw subscribers on page 1185
show unified-edge ggsn-pgw subscribers detail on page 1185
show unified-edge ggsn-pgw subscribers extensive (GTP Version 1 Subscribers) on page 1186
show unified-edge ggsn-pgw subscribers extensive (GTP Version 2 Subscribers) on page 1187

**Output Fields** Table 89 on page 1179 lists the output fields for the **show unified-edge ggsn-pgw subscribers** command. Output fields are listed in the approximate order in which they appear.

### Table 89: show unified-edge ggsn-pgw subscribers Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the GGSN or P-GW. | All levels<br>none |
| **IMSI** | IMSI of the subscriber's user equipment. | **brief**<br>none |
| **MSISDN** | MSISDN number of the subscriber's user equipment. | **brief**<br>none |
| **Subscriber Address** | IP address of the subscriber's user equipment. | **brief**<br>none |
| **Peer Address** | IP address of the GTP peer through which the subscriber is connected to the broadband gateway. | **brief**<br>none |
| **APN** | Access point name (APN), on the broadband gateway, to which the subscriber is attached. | **brief**<br>none |
| **Subscriber Information:** | | |
| **UE** | | |
| **IMSI** | IMSI of the subscriber's user equipment. | **detail**<br>**extensive** |

Table 89: show unified-edge ggsn-pgw subscribers Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **IMEI** | International Mobile Station Equipment Identity (IMEI) of the subscriber's user equipment. | **detail**<br>**extensive** |
| **MSISDN** | MSISDN number of the subscriber's user equipment. | **extensive** |
| **Time Zone** | Time zone to which the subscriber belongs. | **extensive** |
| **DST** | Daylight saving time applicable within the time zone. | **extensive** |
| **RAT Type** | Type of Radio Access Technology (RAT) used. | **detail**<br>**extensive** |
| **User Location Info:** | | |
| **MCC** | Mobile country code (MCC) of the subscriber. | **extensive** |
| **MNC** | Mobile network code (MNC) of the subscriber. | **extensive** |
| **LAC** | Location area code (LAC) of the subscriber. | **extensive** |
| **CI** | Cell Identity (CI) of the subscriber. | **extensive** |
| **SAC** | Service area code (SAC) of the subscriber. | **extensive** |
| **RAC** | Routing area code (RAC) of the subscriber. | **extensive** |
| **TAC** | Tracking area code (TAC) of the subscriber. | **extensive** |
| **ECI** | E-UTRAN Cell identifier (ECI) of the subscriber. | **extensive** |
| **PDN Session:** | | |
| **APN name** | Access point name for the Packet Data Network (PDN) session. | **detail**<br>**extensive** |
| **IPv4 Address** | IPV4 address of the subscriber. | **detail**<br>**extensive** |
| **IPv6 Address** | IPV6 address of the subscriber. | **detail**<br>**extensive** |
| **GTP Version** | GTP version used for the control plane. | **detail**<br>**extensive** |

Table 89: show unified-edge ggsn-pgw subscribers Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Address Assignment** | Indicates the method used to allocate the subscriber's address:<br>• **AAA**—Address was allocated by the authentication, authorization, and accounting (AAA) server.<br>• **DCHP**—Address was allocated by the gateway using the IP addresses returned by the Dynamic Host Configuration Protocol (DHCP) server.<br>• **Local**—Address was allocated by the gateway based on the local mobile pool or mobile pool group configured on the APN.<br>• **Static**—Address was pre-allocated to the user equipment. | |
| **Local Control IP** | Local IPV4 address of the broadband gateway to which the peer (Serving GPRS Support Node [SGSN] or S-GW [Serving Gateway]) will send the control messages for the subscriber. | **detail**<br>**extensive** |
| **Remote Control IP** | IP address of the peer (SGSN or S-GW) to which the broadband gateway will send control messages for the subscriber. | **detail**<br>**extensive** |
| **Local Control TEID** | Tunnel endpoint identifier (TEID) allocated locally by the broadband gateway for the control plane or signaling messages. The control peers (SGSN or S-GW) send this TEID in all control messages to the broadband gateway. | **detail**<br>**extensive** |
| **Remote Control TEID** | Control TEID for the session, which is allocated by the remote control peer (SGSN or S-GW). The broadband gateway sends this TEID in the GTP header in all control messages to the peer. | **detail**<br>**extensive** |
| **Peer CSID** | Connection Set Identifier (CSID) allocated by the GTP peer (S-GW). | **extensive** |
| **Remote CSID** | CSID allocated by the Mobility Management Entity (MME). It identifies the connection set on the MME to which the session belongs. | **extensive** |
| **Selection mode** | APN selection mode provided by the SGSN or S-GW in the Create Request message. | **extensive** |
| **Session PIC** | FPC and PIC slots for the session PIC on which the subscriber control session is present. | **detail**<br>**extensive** |
| **PFE** | FPC and PIC slots for the Packet Forwarding Engine for the PDP session. | **detail**<br>**extensive** |
| **Service PIC** | FPC and PIC slot numbers of the services PIC on which the subscriber services are anchored. | **detail**<br>**extensive** |
| **Session State** | State of the subscriber session on the signaling plane. | **detail**<br>**extensive** |

Table 89: show unified-edge ggsn-pgw subscribers Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Session Duration** | Duration of the PDP session. | **detail**<br>**extensive** |
| **Roaming Status** | Roaming status of the subscriber; that is, whether the subscriber is a visitor, home subscriber, or a roamer. | **detail**<br>**extensive** |
| **Serving network** | The following information about the network that is serving the subscriber (that the subscriber is attached to) is displayed:<br>• **MCC**—Mobile country code of the network.<br>• **MNC**—Mobile network code of the network. | **detail**<br>**extensive** |
| **Direct Tunnel** | Status of the GTPv1 direct tunnel: enabled or disabled. | **detail**<br>**extensive** |
| **Negotiated APN AMBR** | The aggregate maximum bit rate (AMBR) negotiated for the PDP session is displayed for the following:<br>• **Downlink**—Negotiated AMBR in the downlink direction.<br>• **Uplink**—Negotiated AMBR in the uplink direction. | **detail**<br>**extensive** |
| **Requested APN AMBR** | The AMBR requested by the user equipment for the session is displayed for the following:<br>• **Downlink**—Requested AMBR in the downlink direction.<br>• **Uplink**—Requested AMBR in the uplink direction. | **extensive** |
| **Bearer:** | | |
| **NSAPI/EBI** | Network Service Access Point Identifier (NSAPI) or the Evolved Packed System Bearer ID (EBI) for the session. | **detail**<br>**extensive** |
| **Local Data IP** | IP address of the broadband gateway to which the peer sends the data packets for the PDP context or bearer. | **detail**<br>**extensive** |
| **Remote Data IP** | IP address of the peer to which the broadband gateway sends the data packets for the PDP context or bearer. | **detail**<br>**extensive** |
| **Local Data TEID** | Data TEID allocated by the broadband gateway which identifies the data tunneling endpoint for all data packets coming in from the data peer. This is sent in the GTP header for all data packets coming from the peer GTP nodes (SGSN or S-GW). | **detail**<br>**extensive** |
| **Remote Data TEID** | Data TEID allocated by the data plane peer for the session which identifies the data tunneling endpoint for all data packets sent from the broadband gateway to the remote peer. | **detail**<br>**extensive** |

Table 89: show unified-edge ggsn-pgw subscribers Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Bearer State** | Represents the state of the subscriber in the forwarding or data plane. This parameter is used internally by the broadband gateway. | **detail**<br>**extensive** |
| **Substate** | Represents the substate of the subscriber in the forwarding or data plane. This parameter is used internally by the broadband gateway. | **extensive** |
| **Idle Timeout** | Idle timeout for the session, in minutes. | **detail**<br>**extensive** |
| **AAA Interim Interval** | Authentication, authorization, and accounting (AAA) interim account timer, in minutes. | **detail**<br>**extensive** |
| **Negotiated QoS Parameters** | The following QoS parameters negotiated by the user equipment are displayed:<br>• For GTP version 1 subscribers:<br>  ◦ **Traffic Class**—Conversational, streaming, interactive, or background.<br>  ◦ **ARP**—Allocation and retention priority (ARP).<br>  ◦ **Traffic Handling Priority**<br>  ◦ **Transfer Delay**—Transfer delay in milliseconds.<br>  ◦ **MBR Uplink**—Maximum bit rate (MBR) in the uplink direction, in kbps.<br>  ◦ **MBR Downlink**—MBR in the downlink direction, in kbps.<br>  ◦ **Signaling Indicator**—Signaling indication sent by the user equipment in the QoS Information Element (IE);1 indicates Yes and 0 indicates No. This field is valid only for the interactive traffic class.<br>  ◦ **Forwarding Class**<br>  ◦ **Loss Priority**—Packet loss priority<br>• For GTP version 2 subscribers:<br>  ◦ **QCI**—QoS Class Identifier.<br>  ◦ **ARP: (PL/PVI/PCI)**—The following parameters related to ARP are displayed:<br>  ▪ Priority level (PL)<br>  ▪ Preemption Vulnerability Indicator (PVI)<br>  ▪ Preemption Capability Indicator (PCI)<br>  ◦ **Forwarding Class**<br>  ◦ **Loss Priority**—Packet loss priority | **detail**<br>**extensive** |

Table 89: show unified-edge ggsn-pgw subscribers Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Requested QoS Parameters** | The following QoS parameters negotiated by the user equipment are displayed:<br>• For GTP version 1 subscribers:<br>  • **Traffic Class**—Conversational, streaming, interactive, or background.<br>  • **ARP**<br>  • **Traffic Handling Priority**<br>  • **Transfer Delay**<br>  • **MBR Uplink**—MBR in the uplink direction, in kbps.<br>  • **MBR Downlink**—MBR in the downlink direction, in kbps.<br>  • **Signaling Indicator**—Signaling indication sent by the user equipment in the QoS Information Element (IE);1 indicates Yes and 0 indicates No. This field is valid only for the interactive traffic class.<br>  • **Forwarding Class**<br>  • **Loss Priority**—Packet loss priority<br>• For GTP version 2 subscribers:<br>  • **QCI**—QoS Class Identifier<br>  • **ARP: (PL/PVI/PCI)**—The following parameters related to ARP are displayed:<br>  • Priority Level<br>  • Preemption Vulnerability Indicator (PVI)<br>  • Preemption Capability Indicator (PCI) | **extensive** |
| **Charging information** | The following information related to charging is displayed:<br>• **Charging ID**—Charging ID for the session. The charging ID is the unique bearer identity sent in accounting messages and in Charging Data Records (CDRs).<br>• **Profile ID**—ID of the charging profile associated with the bearer.<br>• **State**—(extensive only) Current charging state for the bearer.<br>• **Previous State**—(extensive only) Previous charging state for the bearer.<br>• **Profile selection criteria**—(extensive only) Selection source (home, visitor, roamer, and default) for the charging profile for the bearer.<br>• **Offline charging information**—(extensive only) The following details of offline charging information are displayed if offline charging is enabled; if not, an indication that offline charging is disabled is displayed:<br>  • **Current service data container sequence number**—Sequence number of the current local service data container.<br>  • **Current partial record sequence number**—Sequence number of the current partial record CDR.<br>  • **Number of CDRs closed**—Number of closed CDRs generated.<br>  • **Number of containers closed**—Number of containers closed. | **detail**<br><br>**extensive** |

Table 89: show unified-edge ggsn-pgw subscribers Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Rating group information** | The following information related to the rating group is displayed:<br>• **Rating group**—Default rating group associated with the bearer.<br>• **Service ID**—Service identifier of the rating group.<br>• **Action ID**—(extensive only) Action identifier of the rating group.<br>• **Trigger profile**—(extensive only) Trigger profile number associated with the rating group.<br>• **Change condition bitmask**—(extensive only) Rating group trigger change condition bitmask.<br>• **Action-id-bitmask**—(extensive only) Charging action ID bitmask.<br>• **Signal bitmask**—(extensive only) Rating group trigger signal condition bitmask.<br>• **Last signal bitmask**—(extensive only) Previous rating group trigger signal condition bitmask.<br>• **Last statistics info**—(extensive only) The following information about the last statistics collected is displayed if statistics were collected; if not, an indication that no statistics were collected is displayed:<br>  • **Collection time**—Time when the last control plane recorded statistics for the subscriber.<br>  • **Uplink packets**—Number of packets handled in the uplink direction.<br>  • **Downlink packets**—Number of packets handled in the downlink direction.<br>  • **Uplink bytes**—Number of bytes handled in the uplink direction.<br>  • **Downlink bytes**—Number of bytes handled in the downlink direction. | **detail**<br>**extensive** |

## Sample Output

**show unified-edge ggsn-pgw subscribers**

```
user@host> show unified-edge ggsn-pgw subscribers
Gateway: PGW
    IMSI            MSISDN          Subscriber          Peer          APN
                                     Address           Address
 123213213123256      1926737745  20.20.4.1         200.6.88.2     jnpr-sunnyvale
```

**show unified-edge ggsn-pgw subscribers detail**

```
user@host> show unified-edge ggsn-pgw subscribers detail
Gateway: PGW

Subscriber Information:
  UE:
    IMSI: 123567213123256              IMEI: 1122334455667788
    RAT Type: E-UTRAN
  PDN Session:
    APN name: jnpr-sunnyvale
    IPv4 Address: 20.20.44.1           IPv6 Address: None
    GTP Version: 2                     Address Assignment: Local

    Local Control IP: 200.1.5.1        Remote Control IP: 200.1.6.1
    Local Control TEID: 0x25000000     Remote Control TEID: 0x15002c00
    Session PIC: 1 /1  (FPC/PIC)       PFE: 2 /2  (FPC/PIC)
    Service PIC: None/None (FPC/PIC)
    Session State: Established         Session Duration: 5:38
    Roaming Status: Visitor            Serving network: MCC: 123  MNC: 567
    Direct Tunnel: Disabled
```

```
  Negotiated APN AMBR: Downlink: 128 kbps        Uplink: 128  kbps
Bearer:
  NSAPI/EBI: 5
  Local Data IP: 200.1.5.1           Remote Data IP: 200.1.6.1
  Local Data TEID: 0x3c150000        Remote Data TEID: 0x14250400
  Bearer State: Established
  Idle Timeout: 0   min              AAA Interim Interval: 0   min
  Negotiated QoS Parameters:
     QCI: 5                          ARP: 1 /0 /0   (PL/PVI/PCI)
     Forwarding Class:  None         Loss Priority:  None
  Charging information:
     Charging ID: 0x25000000
     Profile ID: 0
  Rating group information:
     Rating group: 0 Service id: 0
```

### show unified-edge ggsn-pgw subscribers extensive (GTP Version 1 Subscribers)

```
user@host> show unified-edge ggsn-pgw subscribers extensive
Gateway: PGW1

Subscriber Information:
  UE:
    IMSI: 734444553443191              IMEI: 1122334455667790
    MSISDN: 34555557                   Time Zone: GMT     DST: None
    RAT Type: UTRAN
    User Location Info:
      MCC:  None   MNC:  None
      LAC: 0x0  CI: 0x0     SAC: 0x0  RAC: 0x0  TAC: 0x0  ECI: 0x0
  PDN Session:
    APN name: internet123
    IPv4 Address: 20.1.0.1             IPv6 Address: None
    GTP Version: 1                     Address Assignment: Local
    Local Control IP: 18.1.1.2         Remote Control IP: 30.1.1.2
    Local Control TEID: 0x12000000     Remote Control TEID: 0x1f9
    Selection mode: MS provided APN, subscription not verified
    Session PIC: 0 /0  (FPC/PIC)       PFE: 5 /0  (FPC/PIC)
    Service PIC: None/None (FPC/PIC)
    Session State: Established         Session Duration: 9
    Roaming Status: Visitor            Serving network: MCC: None MNC: None
    Direct Tunnel: Disabled
  Bearer:
    NSAPI/EBI: 5
    Local Data IP: 18.1.1.2            Remote Data IP: 30.1.1.2
    Local Data TEID: 0x14120000        Remote Data TEID: 0x1f8
    Bearer State: Established          Substate: None
    Idle Timeout: 0   min              AAA Interim Interval: 0   min
    Negotiated QoS Parameters:
       Traffic Class:Conversational       ARP: 1
       Traffic Handling Priority:0        Transfer Delay: 80
       MBR Uplink: 8640             kbps  MBR Downlink: 8640      kbps
       GBR Uplink: 4672             kbps   GBR Downlink: 4672      kbps
                                           Signaling Indicator: 0
       Forwarding Class:  None         Loss Priority:  None
    Requested QoS Parameters:
       Traffic Class: Conversational      ARP: 1
       Traffic Handling Priority: 0       Transfer Delay: 10
       MBR Uplink  : 8640           kbps  MBR Downlink: 8640      kbps
       GBR Uplink  : 4672           kbps  GBR Downlink: 4672      kbps
                                           Signaling Indicator: 0
    Charging information:
       Charging ID: 0x12000000
```

```
    Profile ID: 0
    State: Init                    Previous State: Init
    Profile selection criteria: None
  Offline charging information: Disabled
  Rating group information:
    Rating group: 0 Service id: 0
    Action ID: 0x0                    Trigger profile: 0
    Change condition bitmask: 0x0     Action-id-bitmask: 0x0
    Signal bitmask: 0x0               Last signal bitmask: 0x0
    Last statistics info:
      Collection time: None collected
```

### show unified-edge ggsn-pgw subscribers extensive (GTP Version 2 Subscribers)

```
user@host> show unified-edge ggsn-pgw subscribers extensive
Gateway: PGW1

Subscriber Information:
  UE:
    IMSI: 324213213134030             IMEI: 1122334455667790
    MSISDN: 1926737867                Time Zone: GMT     DST: None
    RAT Type: E-UTRAN
    User Location Info:
      MCC:  None   MNC: 180
      LAC: 0x22 CI: 0x0     SAC: 0x2b RAC: 0x0  TAC: 0x4  ECI: 0x0
  PDN Session:
    APN name: internet123
    IPv4 Address: 20.1.0.1            IPv6 Address: None
    GTP Version: 2                    Address Assignment: Local
    Local Control IP: 18.1.1.2        Remote Control IP: 30.1.1.2
    Local Control TEID: 0x14000000    Remote Control TEID: 0x113
    Peer CSID: 0                      Remote CSID: 0
    Selection mode: MS or network provided APN, subscription verified
    Session PIC: 0 /0  (FPC/PIC)      PFE: 5 /0  (FPC/PIC)
    Service PIC: None/None (FPC/PIC)
    Session State: Established        Session Duration: 10
    Roaming Status: Visitor           Serving network: MCC: 123  MNC: 567
    Direct Tunnel: None
    Negotiated APN AMBR: Downlink: 128 kbps       Uplink: 128  kbps
    Requested  APN AMBR: Downlink: 128 kbps       Uplink: 128  kbps
  Bearer:
    NSAPI/EBI: 5
    Local Data IP: 18.1.1.2           Remote Data IP: 30.1.1.2
    Local Data TEID: 0x14140000       Remote Data TEID: 0x114
    Bearer State: Established         Substate: None
    Idle Timeout: 0   min             AAA Interim Interval: 0   min
    Negotiated QoS Parameters:
      QCI: 5                          ARP: 2 /0 /0   (PL/PVI/PCI)
      Forwarding Class:  None         Loss Priority:  None
    Requested QoS Parameters:
      QCI: 5                          ARP: 2 /0 /0   (PL/PVI/PCI)
    Charging information:
      Charging ID: 0x14000000
      Profile ID: 0
      State: Init                     Previous State: Init
      Profile selection criteria: None
    Offline charging information: Disabled
    Rating group information:
      Rating group: 0 Service id: 0
      Action ID: 0x0                  Trigger profile: 0
      Change condition bitmask: 0x0   Action-id-bitmask: 0x0
      Signal bitmask: 0x0             Last signal bitmask: 0x0
```

```
Last statistics info:
  Collection time: None collected
```

## show unified-edge ggsn-pgw subscribers charging

**Syntax**

**show unified-edge ggsn-pgw subscribers charging gateway *gateway***
**<brief | detail | extensive>**
**<charging-profile *charging-profile*>**
**<fpc-slot *fpc-slot*>**
**<pic-slot *pic-slot*>**
**<transport-profile *transport-profile*>**

**Release Information**

Command introduced in Junos OS Mobility Release 11.2W.

**Description**

Display the subscribers matching the specified charging profile or transport profile on the specified gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW).

**Options**

**gateway *gateway***—Display the subscriber information for the specified gateway name.

**brief | detail | extensive** —(Optional) Display the specified level of output.

**charging-profile *charging-profile***—(Optional) Display the subscribers matching the specified charging profile name.

NOTE: You must specify either a charging profile or a transport profile to execute this command.

**fpc-slot *fpc-slot***—(Optional) Display the subscriber information for the specified FPC slot number.

**pic-slot *pic-slot***—(Optional) Display the subscriber information for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**transport-profile *transport-profile***—(Optional) Display the subscribers matching the specified transport profile name.

NOTE: You must specify either a charging profile or a transport profile to execute this command.

**Required Privilege Level**

view

**Related Documentation**

- clear unified-edge ggsn-pgw subscribers charging on page 1151
- show unified-edge ggsn-pgw subscribers on page 1177

List of Sample Output

show unified-edge ggsn-pgw subscribers charging gateway gw1 charging-profile cp1 brief on page 1190
show unified-edge ggsn-pgw subscribers charging gateway gw1 charging-profile cp1 detail on page 1190
show unified-edge ggsn-pgw subscribers charging gateway gw1 charging-profile cp1 extensive on page 1191

Output Fields

Refer to the output fields for the show unified-edge ggsn-pgw subscribers command, which is the same as the output fields for the **show unified-edge ggsn-pgw subscribers charging** command.

## Sample Output

**show unified-edge ggsn-pgw subscribers charging gateway gw1 charging-profile cp1 brief**

```
user@host> show unified-edge ggsn-pgw subscribers charging gateway gw1 charging-profile
cp1 brief
    IMSI            MSISDN          Subscriber         Peer           APN
                                     Address          Address
 111222330000003    444550000003  200.1.40.1        50.50.50.3     internet123
```

**show unified-edge ggsn-pgw subscribers charging gateway gw1 charging-profile cp1 detail**

```
user@host> show unified-edge ggsn-pgw subscribers charging gateway gw1 charging-profile
cp1 detail

Subscriber Information:
    IMSI: 111222330000003             IMEI: None
    RAT Type: Unknown                 Status: Visitor
  PDN Session:
    APN name: internet123
    IPv4 Address: 200.1.40.1          IPv6 Address: None
    GTP Version: 1                    Session Duration: 6:01:12
    Local Control address: 200.1.88.1 Remote Control address: 50.50.50.3
    TEID Control Local: 0x10000801    TEID Control Remote: 0x3
    Session PIC: 5 /0  (FPC/PIC)      Anchor PFE: 0 /0  (FPC/PIC)
    Service PIC: 0 /0  (FPC/PIC)      Service PFE: 0 /0  (ifd/vpfe-id)
    Session State: Established
  Bearer:
  Bearer:
    NSAPI/EBI: 5           Charging ID: 0x10000401
    Local Data address: 200.1.88.1    Remote Data address: 50.50.50.3
    Local TEID: 0x14100800            Remote TEID: 0x2713
    Bearer State: Established         Substate: -
    Idle Timeout: 0   min(0 -0,0)     AAA Interim Interval: 0   min(0 -0,0)
    Negotiated QoS Parameters:
       Traffic Class:Interactive            ARP: 1
       Traffic Handling Priority:1          Transfer Delay: 0
       MBR Uplink: 2048             kbps    MBR Downlink: 2048      kbps
                                            Signaling Indicator: 0
       Forwarding Class:  None              Loss Priority:  None
    Requested QoS Parameters:
       Traffic Class: Interactive           ARP: 1
       Traffic Handling Priority: 1         Transfer Delay: 0
       MBR Uplink  : 2048           kbps    MBR Downlink: 2048      kbps
                                            Signaling Indicator: 0
    Charging information: Profile ID: 1     Profile name: cp1
       State: Ready                         Previous State: Ga
       Details: Offline bearer
    Rating group information:
       Rating group: 0 Service id: 0
```

```
        Details: Bearer trigger, Offline RG
```

### show unified-edge ggsn-pgw subscribers charging gateway gw1 charging-profile cp1 extensive

```
user@host> show unified-edge ggsn-pgw subscribers charging gateway gw1 charging-profile
cp1 extensive

Subscriber Information:
    IMSI: 111222330000003            IMEI: None
    MSISDN: 444550000003             Time Zone: GMT     (DST): None
    RAT Type: Unknown                Status: Visitor
      MCC:  None  MNC:  None
      LAC: 0x0  CI: 0x0     SAC: 0x0  RAC: 0x0  TAC: 0x0  ECI: 0x0
  PDN Session:
    APN name: internet123
    IPv4 Address: 200.1.40.1        IPv6 Address: None
    GTP Version: 1                  Session Duration: 6:01:19
    Local Control address: 200.1.88.1 Remote Control address: 50.50.50.3
    TEID Control Local: 0x10000801  TEID Control Remote: 0x3
    Addressing scheme: Local        Selection mode: MS or network provided APN,
subscription verified
    Session PIC: 5 /0  (FPC/PIC)    Anchor PFE: 0 /0  (FPC/PIC)
    Service PIC: 0 /0  (FPC/PIC)    Service PFE: 0 /0  (ifd/vpfe-id)
    Session State: Established
    Direct Tunnel: Disabled          Serving network: MCC: 123  MNC :456
  Bearer:
  Bearer:
    NSAPI/EBI: 5           Charging ID: 0x10000401
    Local Data address: 200.1.88.1   Remote Data address: 50.50.50.3
    Local TEID: 0x14100800           Remote TEID: 0x2713
    Bearer State: Established        Substate: -
    Idle Timeout: 0   min(0 -0,0)    AAA Interim Interval: 0   min(0 -0,0)
    Negotiated QoS Parameters:
       Traffic Class:Interactive          ARP: 1
       Traffic Handling Priority:1        Transfer Delay: 0
       MBR Uplink: 2048             kbps  MBR Downlink: 2048      kbps
                                          Signaling Indicator: 0
       Forwarding Class:  None            Loss Priority:  None
    Requested QoS Parameters:
       Traffic Class: Interactive         ARP: 1
       Traffic Handling Priority: 1       Transfer Delay: 0
       MBR Uplink  : 2048           kbps  MBR Downlink: 2048      kbps
                                          Signaling Indicator: 0
    Charging information: Profile ID: 1   Profile name: cp1
       State: Ready                       Previous State: Ga
       Profile selection criteria: Static default
       Details: Offline bearer
    Offline charging information:
       Current service data container sequence number: 0
       Current partial record sequence number        : 0
       Number of CDRs closed                         : 0
       Number of containers closed                   : 0
    Rating group information:
       Rating group: 0 Service id: 0
       Action ID: 0x2000401               Trigger profile: 1
       Change condition bitmask: 0x0      Action-id-bitmask: 0x0
       Signal bitmask: 0x0                Last signal bitmask: 0x0
       Details: Bearer trigger, Offline RG
         Collection time: None collected
```

CHAPTER 32

# Charging Operational Commands

## clear unified-edge ggsn-pgw charging cdr

**Syntax** **clear unified-edge ggsn-pgw charging cdr gateway-name *name***
<transport-profile-name *profile-name*>

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Clear the Charging Data Records (CDRs) from the services PICs for the configured transport profiles on the specified gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW).

**Options** **gateway-name *name***—Clear CDRs from the services PICs for the specified GGSN or P-GW.

**transport-profile-name *profile-name***—(Optional) Clear CDRs from the services PICs only for the specified transport profile.

**Required Privilege Level** clear, unified-edge

**Related Documentation**
- show unified-edge ggsn-pgw charging transfer status on page 1231

**List of Sample Output** clear unified-edge ggsn-pgw charging cdr gateway-name name on page 1194

**Output Fields** No message is displayed on successful execution of this command; otherwise an error message is displayed.

### Sample Output

**clear unified-edge ggsn-pgw charging cdr gateway-name name**

```
user@host> clear unified-edge ggsn-pgw charging cdr gateway-name PGW
```

## clear unified-edge ggsn-pgw charging cdr wfa

**Syntax** **clear unified-edge ggsn-pgw charging cdr wfa gatway-name *name* <transport-profile-name *profile-name*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Clear from the services PICs the Charging Data Records (CDRs) that have not received an acknowledgement from the charging gateway function (CGF), the Routing Engine, or both.

**Options**

**gateway-name *name***—Clear the unacknowledged CDRs from the services PICs for the specified GGSN or P-GW.

**transport-profile-name *profile-name***—(Optional) Clear the unacknowledged CDRs from the services PICs only for the specified transport profile.

**Required Privilege Level** clear, unified-edge

**Related Documentation**

- show unified-edge ggsn-pgw charging transfer status on page 1231

**List of Sample Output** clear unified-edge ggsn-pgw charging cdr wfa gateway-name name on page 1195

**Output Fields** No message is displayed on successful execution of this command; otherwise an error message is displayed.

### Sample Output

**clear unified-edge ggsn-pgw charging cdr wfa gateway-name name**

```
user@host> clear unified-edge ggsn-pgw charging cdr wfa gateway-name PGW
```

## clear unified-edge ggsn-pgw charging local-persistent-storage statistics

**Syntax** **clear unified-edge ggsn-pgw charging local-persistent-storage statistics gateway-name** *name*

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Clear the storage statistics of the Charging Data Record (CDR) files on the local Routing Engine disk on the specified Gateway GPRS Support Node (GGSN) or Packet Data Network Gateway (P-GW).

**Options** **gateway-name** ***name***—Clear the storage statistics for the specified gateway.

**Required Privilege Level** clear, unified-edge

**Related Documentation**
- show unified-edge ggsn-pgw charging local-persistent-storage statistics on page 1211

**List of Sample Output** clear unified-edge ggsn-pgw charging local-persistent-storage statistics gateway-name name on page 1196

**Output Fields** When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**clear unified-edge ggsn-pgw charging local-persistent-storage statistics gateway-name name**

```
user@host> clear unified-edge ggsn-pgw charging local-persistent-storage statistics
gateway-name PGW
Cleared charging local persistent storage statistics
```

## clear unified-edge ggsn-pgw charging path statistics

**Syntax** **clear unified-edge ggsn-pgw charging path statistics gateway-name** *name*
**<fpc-slot** *slot-number* **pic-slot** *slot-number***>**
**<gtpp-peer-addr** *ipv4-address***>**
**<gtpp-peer-name** *peer-name***>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Clear the path management message statistics between the charging data function (CDF) and the charging gateway function (CGF) servers for the specified gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW).

**Options**

**gateway-name** *name*—Clear the path management message statistics for the specified GGSN or P-GW.

**fpc-slot** *slot-number* **pic-slot** *slot-number*—(Optional) Clear the path management message statistics only for the specified FPC slot number and PIC slot number.

**gtpp-peer-addr** *ipv4-address*—(Optional) Clear the path management message statistics only for the GTP Prime peer with the specified IPv4 address.

**gtpp-peer-name** *peer-name*—(Optional) Clear the path management message statistics only for the GTP Prime peer with the specified name.

**Required Privilege Level** clear, unified-edge

**Related Documentation**

- show unified-edge ggsn-pgw charging path statistics on page 1217

**List of Sample Output** clear unified-edge ggsn-pgw charging path statistics gateway-name name on page 1197

**Output Fields** When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**clear unified-edge ggsn-pgw charging path statistics gateway-name name**

```
user@host> clear unified-edge ggsn-pgw charging path statistics gateway-name PGW
Cleared charging path statistics
```

## clear unified-edge ggsn-pgw charging transfer statistics

**Syntax** clear unified-edge ggsn-pgw charging transfer statistics gateway-name *name*
<fpc-slot *slot-number* pic-slot *slot-number*>
<transport-profile-name *profile-name*>

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Clear the charging transfer statistics on one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then charging transfer statistics for all GGSNs or P-GWs are cleared.

**Options**

gateway-name *name*—Clear the transfer statistics for the specified GGSN or P-GW.

fpc-slot *slot-number* pic-slot *slot-number*—(Optional) Clear the transfer statistics for the configured transport profiles for the specified FPC slot number and PIC slot number.

transport-profile-name *profile-name*—(Optional) Clear the transfer statistics only for the specified transport profile.

**Required Privilege Level** clear, unified-edge

**Related Documentation**

- show unified-edge ggsn-pgw charging transfer statistics on page 1228

**List of Sample Output** clear unified-edge ggsn-pgw charging transfer statistics gateway-name name on page 1198

**Output Fields** When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**clear unified-edge ggsn-pgw charging transfer statistics gateway-name name**

```
user@host> clear unified-edge ggsn-pgw charging transfer statistics gateway-name PGW
Cleared charging transfer statistics
```

## clear unified-edge sgw charging cdr

**Syntax** **clear unified-edge sgw charging cdr gateway-name *name* <transport-profile-name *profile-name*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Clear the Charging Data Records (CDRs) from the services PICs for the configured transport profiles on the specified Serving Gateway (S-GW).

**Options** **gateway-name *name***—Clear the CDRs from the services PICs for the specified gateway.

**transport-profile-name *profile-name***—(Optional) Clear the CDRs from the services PICs for the specified transport profile.

**Required Privilege Level** clear, unified-edge

**Related Documentation**
- clear unified-edge sgw charging cdr wfa on page 1200
- show unified-edge sgw charging transfer status on page 1259

**List of Sample Output** clear unified-edge sgw charging cdr gateway-name SGW on page 1199

**Output Fields** No message is displayed on successful execution of this command; otherwise an error message is displayed.

### Sample Output

**clear unified-edge sgw charging cdr gateway-name SGW**

```
user@host> clear unified-edge sgw charging cdr gateway-name SGW
```

## clear unified-edge sgw charging cdr wfa

**Syntax** **clear unified-edge sgw charging cdr wfa gateway-name *name* <transport-profile-name *profile-name*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Clear from the services PICs (for one or more Serving Gateways [S-GWs]) the Charging Data Records (CDRs) that have not received an acknowledgement from the charging gateway function (CGF), the Routing Engine, or both.

**Options**

**gateway-name *name***—Clear the unacknowledged CDRs from the services PICs for the specified S-GW.

**transport-profile-name *profile-name***—(Optional) Clear the unacknowledged CDRs from the services PICs only for the specified transport profile.

**Required Privilege Level** clear, unified-edge

**Related Documentation**

- clear unified-edge sgw charging cdr on page 1199
- show unified-edge sgw charging transfer status on page 1259

**List of Sample Output** clear unified-edge sgw charging cdr wfa gateway-name name on page 1200

**Output Fields** No message is displayed on successful execution of this command; otherwise an error message is displayed.

### Sample Output

**clear unified-edge sgw charging cdr wfa gateway-name name**

```
user@host> clear unified-edge sgw charging cdr wfa gateway-name PGW
```

## clear unified-edge sgw charging local-persistent-storage statistics

**Syntax** **clear unified-edge sgw charging local-persistent-storage statistics gateway-name *name***

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Clear the storage statistics of the Charging Data Record (CDR) files on the local Routing Engine disk on the specified Serving Gateway (S-GW).

**Options** **gateway-name *name***—Clear the storage statistics for the specified gateway.

**Required Privilege Level** clear, unified-edge

**Related Documentation**
- show unified-edge sgw charging local-persistent-storage statistics on page 1239

**List of Sample Output** clear unified-edge sgw charging local-persistent-storage statistics gateway-name SGW on page 1201

**Output Fields** When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**clear unified-edge sgw charging local-persistent-storage statistics gateway-name SGW**

```
user@host> clear unified-edge sgw charging local-persistent-storage statistics gateway-name
SGW
Cleared charging local persistent storage statistics
```

## clear unified-edge sgw charging path statistics

**Syntax**

**clear unified-edge sgw charging path statistics**
**<fpc-slot *slot-number*>**
**<gateway-name *name*>**
**<gtpp-peer-addr *ipv4-address*>**
**<gtpp-peer-name *peer-name*>**
**<pic-slot *slot-number*>**

**Release Information**

Command introduced in Junos OS Mobility Release 11.4W.

**Description**

Clear the path management message statistics (between the charging data function [CDF] and the charging gateway function [CGF] servers) on one or more Serving Gateways (S-GWs). If a gateway name is not specified, then the path management statistics for all S-GWs are cleared.

**Options**

**fpc-slot *slot-number***—(Optional) Clear the path management message statistics for the specified FPC slot number.

**gateway-name *name***—(Optional) Clear the path management message statistics for the specified gateway.

**gtpp-peer-addr *ipv4-address***—(Optional) Clear the path management message statistics for the GTP Prime peer with the specified IPv4 address.

**gtpp-peer-name *peer-name***—(Optional) Clear the path management message statistics for the GTP Prime peer with the specified name.

**pic-slot *slot-number***—(Optional) Clear the path management message statistics for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**Required Privilege Level**

clear, unified-edge

**Related Documentation**

- show unified-edge sgw charging path statistics on page 1245

**List of Sample Output**

clear unified-edge sgw charging path statistics on page 1202

**Output Fields**

When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**clear unified-edge sgw charging path statistics**

```
user@host> clear unified-edge sgw charging path statistics
Cleared charging path statistics
```

## clear unified-edge sgw charging transfer statistics

**Syntax**
clear unified-edge sgw charging transfer statistics
<fpc-slot *slot-number*>
<gateway-name *name*>
<pic-slot *slot-number*>
<transport-profile-name *profile-name*>

**Release Information**
Command introduced in Junos OS Mobility Release 11.4W.

**Description**
Clear the transfer statistics on one or more Serving Gateways (S-GWs). If a gateway name is not specified, then the transfer statistics for all S-GWs are cleared.

**Options**
**none**—Clear the transfer statistics for all S-GWs.

**fpc-slot *slot-number***—(Optional) Clear the transfer statistics for the specified FPC slot number.

**gateway-name *name***—(Optional) Clear the transfer statistics for the specified gateway.

**pic-slot *slot-number***—(Optional) Clear the transfer statistics for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**transport-profile-name *profile-name***—(Optional) Clear the transfer statistics for the specified transport profile.

**Required Privilege Level**
clear, unified-edge

**Related Documentation**
- show unified-edge sgw charging transfer statistics on page 1255

**List of Sample Output**
clear unified-edge sgw charging transfer statistics on page 1203

**Output Fields**
When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**clear unified-edge sgw charging transfer statistics**

```
user@host> clear unified-edge sgw charging transfer statistics
Cleared charging transfer statistics
```

## request system storage unified-edge charging media start

**Syntax** request system storage unified-edge charging media start
<re0 | re1>

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Enable use of local persistent storage for Charging Data Records (CDRs).

**Options** **re0 | re1**—(Optional) On routers that support dual or redundant Routing Engines, use the disk on the Routing Engine in slot 0 (**re0**) or Routing Engine in slot 1 (**re1**).

**Required Privilege Level** maintenance

**Related Documentation**

- request system storage unified-edge media prepare on page 1207
- request system storage unified-edge charging media stop on page 1205
- show unified-edge ggsn-pgw charging local-persistent-storage statistics on page 1211

**List of Sample Output** request system storage unified-edge charging media start on page 1204

**Output Fields** When you enter this command, there is no output for success but an error displays if the command fails to complete.

### Sample Output

**request system storage unified-edge charging media start**

```
user@host> request system storage unified-edge charging media start
```

## request system storage unified-edge charging media stop

**Syntax** request system storage unified-edge charging media stop
<re0 | re1>

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Disable use of local persistent storage for Charging Data Records (CDRs).

**Options** **re0 | re1**—(Optional) On routers that support dual or redundant Routing Engines, use the disk on the Routing Engine in slot 0 (**re0**) or Routing Engine in slot 1 (**re1**).

**Required Privilege Level** maintenance

**Related Documentation**
- request system storage unified-edge media eject on page 1206
- request system storage unified-edge charging media start on page 1204

**List of Sample Output** request system storage unified-edge charging media stop on page 1205

**Output Fields** When you enter this command, there is no output for success but an error displays if the command fails to complete.

### Sample Output

**request system storage unified-edge charging media stop**

```
user@host> request system storage unified-edge charging media stop
```

## request system storage unified-edge media eject

**Syntax** request system storage unified-edge media eject
<re0 | re1>

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Prepare the Solid State Disk (SSD) for removal from the Routing Engine. This command unmounts the SSD from **/opt/mobility**.

**Options** **re0 | re1**—(Optional) On routers that support dual or redundant Routing Engines, prepare the disk on the Routing Engine in slot 0 (**re0**) or Routing Engine in slot 1 (**re1**).

**Required Privilege Level** maintenance

**Related Documentation**
- request system storage unified-edge charging media stop on page 1205

**List of Sample Output** request system storage unified-edge media eject on page 1206

**Output Fields** When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**request system storage unified-edge media eject**

```
user@host> request system storage unified-edge media eject
Media successfully ejected
```

## request system storage unified-edge media prepare

**Syntax**

request system storage unified-edge media prepare
<no-format>
<re0 | re1>

**Release Information**

Command introduced in Junos OS Mobility Release 11.2W.

**Description**

Prepare the Solid State Disk (SSD) on the Routing Engine for local persistent storage of Charging Data Records (CDRs). This command formats the SSD and mounts it to **/opt/mobility**.

NOTE: If you do not want to format the existing content on the SSD, you must specify the **no-format** option.

**Options**

**no-format**—(Optional) Do not format the existing content on the SSD when preparing the disk on the Routing Engine.

**re0 | re1**—(Optional) On routers that support dual or redundant Routing Engines, prepare the disk on the Routing Engine in slot 0 (**re0**) or Routing Engine in slot 1 (**re1**).

**Required Privilege Level**

maintenance

**Related Documentation**

- request system storage unified-edge charging media start on page 1204
- show unified-edge ggsn-pgw charging local-persistent-storage statistics on page 1211

**List of Sample Output**

request system storage unified-edge media prepare on page 1207

**Output Fields**

When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**request system storage unified-edge media prepare**

```
user@host> request system storage unified-edge media prepare
Creating filesystem
Mounting media
Media successfully prepared
```

## show unified-edge ggsn-pgw charging global statistics

**Syntax** show unified-edge ggsn-pgw charging global statistics
<brief | detail>
<fpc-slot *slot-number* pic-slot *slot-number*>
<gateway *gateway-name*>

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the global statistics for charging for one or more Gateway GPRS Support Nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then the statistics for all GGSNs and P-GWs are displayed.

**Options** **none**—(Same as brief) Display the global statistics for charging, in brief.

**brief | detail**—(Optional) Display the specified level of output.

The **brief** option displays the statistics per GGSN or P-GW for all services PICs. The **detail** option displays the statistics per GGSN or P-GW for each services PIC.

**fpc-slot *slot-number* pic-slot *slot-number***—(Optional) Display the global statistics for charging only for the specified FPC slot number and PIC slot number.

**gateway *gateway-name***—(Optional) Display the global statistics for charging for the specified GGSN or P-GW.

**Required Privilege Level** view

**Related Documentation**

- show unified-edge ggsn-pgw charging local-persistent-storage statistics on page 1211
- show unified-edge ggsn-pgw charging path statistics on page 1217
- show unified-edge ggsn-pgw charging transfer statistics on page 1228

**List of Sample Output**

show unified-edge ggsn-pgw charging global statistics brief on page 1209
show unified-edge ggsn-pgw charging global statistics detail on page 1209

**Output Fields** Table 90 on page 1208 lists the output fields for the **show unified-edge ggsn-pgw charging global statistics** command. Output fields are listed in the approximate order in which they appear.

Table 90: show unified-edge sgw charging global statistics Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the GGSN or P-GW. | All levels<br>none |
| **FPC/PIC** | FPC slot number and PIC slot number for which the statistics are displayed. | **detail** |

Table 90: show unified-edge sgw charging global statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **CDR Send Errors** | Number of CDR send errors. This counter indicates an internal error while closing the CDR. | All levels<br><br>none |
| **CDR Encode Errors** | Number of CDR encoding failures. For example, if the buffer is insufficient then the CDR encoding does not take place. | All levels<br><br>none |
| **CDR Alloc Failures** | Number of CDR allocation failures. For example, if there is insufficient memory then the CDR allocation can fail. | All levels<br><br>none |
| **Container Failures** | Number of internal failures pertaining to charging containers. | All levels<br><br>none |
| **Charging Bearers Created** | Number of bearers for which charging is enabled. | All levels<br><br>none |
| **Charging Bearers Destroyed** | Number of charging bearers destroyed. | All levels<br><br>none |

## Sample Output

**show unified-edge ggsn-pgw charging global statistics brief**

```
user@host> show unified-edge ggsn-pgw charging global statistics brief
Gateway: PGW
Charging Global Statistics

  CDR Send Errors                       : 8
  CDR Encode Errors                     : 0
  CDR Alloc Failures                    : 0
  Container Failures                    : 0
  Charging Bearers Created              : 100
  Charging Bearers Destroyed            : 4
```

**show unified-edge ggsn-pgw charging global statistics detail**

```
user@host> show unified-edge ggsn-pgw charging global statistics detail
Gateway: PGW
Charging Global Statistics
  FPC/PIC: 1/0
  CDR Send Errors                       : 4
  CDR Encode Errors                     : 0
  CDR Alloc Failures                    : 0
  Container Failures                    : 0
  Charging Bearers Created              : 50
  Charging Bearers Destroyed            : 2

  FPC/PIC: 3/0
  CDR Send Errors                       : 4
  CDR Encode Errors                     : 0
  CDR Alloc Failures                    : 0
```

```
Container Failures                    : 0
Charging Bearers Created              : 50
Charging Bearers Destroyed            : 2
```

## show unified-edge ggsn-pgw charging local-persistent-storage statistics

**Syntax** **show unified-edge ggsn-pgw charging local-persistent-storage statistics <gateway *gateway*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
**gateway-name** option introduced in Junos OS Mobility Release 11.4W.

**Description** Display the storage statistics of the Charging Data Record (CDR) files on the local Routing Engine disk for one or more Gateway GPRS Support Nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then the status for all GGSNs and P-GWs is displayed.

**Options** **gateway *gateway-name***—(Optional) Display the storage statistics for the specified GGSN or P-GW.

**Required Privilege Level** view

**Related Documentation**
- clear unified-edge ggsn-pgw charging local-persistent-storage statistics on page 1196

**List of Sample Output** show unified-edge ggsn-pgw charging local-persistent-storage statistics on page 1215

**Output Fields** Table 91 on page 1211 lists the output fields for the **show unified-edge ggsn-pgw charging local-persistent-storage statistics** command. Output fields are listed in the approximate order in which they appear.

### Table 91: show unified-edge ggsn-pgw charging local-persistent-storage statistics Output Fields

| Field Name | Field Description |
|---|---|
| **Batch Messages received** | Total number of batch messages sent from services PICs to the Routing Engine disk. The CDRs generated in services PICs are sent to the local Routing Engine disk as batch messages. |
| **Batch Responses sent** | Total number of responses sent for the received batch messages. |
| **Invalid Messages received** | Total number of invalid batch messages sent from services PICs to the Routing Engine disk. |
| **Number of temp log files opened** | Total number of temporary CDR files opened on the Routing Engine disk.<br><br>These files are closed and copied from the temporary location to a final location (**/opt/mobility/charging/ggsn/final_log**) within the same Routing Engine disk, from where they can be transferred using SSH FTP (SFTP). A file is closed when the file size, file age, or the maximum number of CDRs added to the file reaches the configured limit (or the default limit, when no limit is configured). |

Table 91: show unified-edge ggsn-pgw charging local-persistent-storage statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Number of journal files opened** | Total number of open journal files. Journal files are used to remove any unfinished file writes from the temporary log files if a daemon or router crash interrupts the kernel file write. When the daemon or router come back up, the journal log files are read to ensure that the contents of the temporary log file are sane. If there is any unfinished CDR data, the temporary log file is truncated to the last-known successful file write. For each temporary log CDR file, a separate journal file is opened. |
| **Number of journal files closed** | Total number of journal files closed. |
| **Number of CDR log files closed** | Total number of temporary CDR log files closed.<br><br>Authorized users can use SFTP to transfer these files from the **/opt/mobility/charging/ggsn/final_log** location. |
| **Number of CDR files closed due to file-age** | Total number of temporary CDR log files closed because the age of the files reached the configured limit (or the default limit, when no limit is configured).<br><br>The default value for the file age is 120 minutes. |
| **Number of CDR files closed due to file-size** | Total number of number of temporary CDR log files closed because the size of the files reached the configured limit (or the default limit, when no limit is configured).<br><br>The default file size is 10 MB. |
| **Number of CDR files closed due to cdr-count** | Total number of temporary CDR log files closed because the maximum number of CDRs added to the files reached the configured limit.<br><br>There is no default limit. |
| **Abnormal file closures** | Total number of abnormal temporary CDR log file closures. This counter is incremented when the charging daemon comes up after a system reboot or crash and temporary CDR log file closures are triggered. |
| **Normal file closures** | Total number of normal temporary CDR log file closures. This counter is incremented when changes in the configuration, such as a file format change, trigger temporary CDR log file closures. |
| **Number of CDR log files closed in TS_32_297 format** | Total number of closed temporary CDR log files that are compliant with the format specified in the 32297 technical specification release. |
| **Number of CDR log files closed in raw asn1 format** | Total number of closed temporary CDR log files that are in the raw ASN.1 format. |
| **Total number of CDRs backed up** | Total number of CDRs backed up to the standby Routing Engine. |

Table 91: show unified-edge ggsn-pgw charging local-persistent-storage statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Disk Full messages sent** | Total number of messages sent by the Routing Engine to the services PICs to indicate that its disk is full and unable to accept any more charging data.<br><br>You can use SFTP to transfer the files from the **/opt/mobility/charging/ggsn/final_log** location to free disk space, or remove the disk and copy the files.<br><br>You can remove the disk by issuing the following commands in this order:<br><br>• **request system storage unified-edge charging media stop**<br>• **request system storage unified-edge media eject** |
| **Disk Full resolve messages sent** | Total number of disk full resolve messages sent. When the disk space is freed, the Routing Engine sends messages to the services PICs indicating that it can receive charging data. |
| **Number of async IO reqs written** | Number of asynchronous I/O requests written. This counter is incremented once for every write operation into the temporary log CDR file. |
| **Disk space status** | Indicates whether disk space is available for storage. The possible values are:<br><br>• **DISK_AVAILABLE**<br>• **DISK_AT_WATERMARK_LEVEL1**<br>• **DISK_AT_WATERMARK_LEVEL2**<br>• **DISK_AT_WATERMARK_LEVEL3**<br>• **DISK_OFFLINE**—Indicates that a disk is not present or the **request system storage unified-edge charging media stop** command has been issued.<br>• **DISK_OFFLINE_PENDING**—Indicates whether any CDRs are being written or mirrored on the backup Routing Engine. This interim status message is displayed after the **request system storage unified-edge charging media stop** command has been issued but before the disk goes offline. |
| **Watermark level1 at (MB)** | Indicates the percentage of the total Routing Engine disk space configured for storage. By default, watermark level 1 is set to 70 percent of the total disk space.<br><br>When this limit is reached, an alert (if configured) is sent and you can take corrective measures to free the disk space. |
| **Watermark level2 at (MB)** | Indicates the percentage of the total Routing Engine disk space configured for storage. By default, watermark level 2 is set to 80 percent of the total disk space.<br><br>When this limit is reached, an alert (if configured) is sent and you can take corrective measures to free the disk space. |
| **Watermark level3 at (MB)** | Indicates the percentage of the total Routing Engine disk space configured for storage. By default, watermark level 3 is set to 90 percent of the total disk space.<br><br>When this limit is reached, an alert (if configured) is sent and you can take corrective measures to free the disk space. If an alert is not configured, the services PICs stop sending the charging data to the Routing Engine disk and you must transfer the files using SFTP to free the disk space. However, this data is not lost because it is buffered in the services PICs. The services PICs can buffer up to a maximum of 2 GB of data, after which a Call Admission Control (CAC) is triggered. |

Table 91: show unified-edge ggsn-pgw charging local-persistent-storage statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Temporary CDR log file Statistics**<br>NOTE: The information about temporary CDR log files is displayed only if temporary CDR log files are currently open. | |
| **File Name** | Name of the temporary CDR log file. |
| **Journal file name** | Name of the journal file. |
| **Current number of CDRs** | Total number of CDRs that have been currently added to the temporary CDR log file. |
| **Current file size (bytes)** | Current size, in bytes, of the temporary CDR log file. |
| **File age trigger (mins)** | Configured duration, in minutes, after which the temporary CDR log file is closed. If this parameter is not configured, then the default value is displayed. |
| **File size trigger (bytes)** | Configured size, in bytes, that the temporary CDR log file can reach after which it is closed. If this parameter is not configured, then the default value is displayed. |
| **CDR count trigger** | Configured maximum number of CDRs that can be added to the temporary CDR log file, after which it is closed. If this parameter is not configured, then the default value is displayed. |
| **Global Statistics** | |
| **Disk Offline messages sent** | Total number of messages sent by the Routing Engine to the services PICs to indicate that its disk is offline or is not mounted, and that it is unable to accept any more charging data.<br>You can configure the disk (storage media) to store charging data by issuing these commands:<br>• **request system storage unified-edge media prepare**<br>• **request system storage unified-edge charging media start** |
| **Disk Available messages sent** | When the disk is prepared and mounted, the Routing Engine sends messages to the services PICs to indicate that it can now receive charging data. This field indicates the total number of these messages sent. |
| **Number of CDR storage files on disk** | Total number of CDR files stored on the local Routing Engine disk. |
| **Current storage space in use (MB)** | Storage space, in MB, that is currently being used. |
| **Available storage space on disk (MB)** | Total free space, in MB, available for storage on the disk. |
| **Total storage space on disk (MB)** | Total storage space, in MB, on the disk. |
| **Mirroring Connection Information** | |

Table 91: show unified-edge ggsn-pgw charging local-persistent-storage statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Connection state** | State of the mirroring connection. The following states are possible:<br>• **Active**—Indicates that the mirroring status on Routing Engine is active.<br>• **Standalone**—Indicates that the backup Routing Engine is down, or that graceful Routing Engine switchover (GRES) is not configured.<br>• **Standby**—Indicates that the backup Routing Engine is on standby. |
| **Other RE mirroring connection present** | Indicates whether the mirroring connection is established with the other Routing Engine or not |
| **GRES configured** | Indicates whether GRES is configured or not. |

## Sample Output

**show unified-edge ggsn-pgw charging local-persistent-storage statistics**

```
user@host> show unified-edge ggsn-pgw charging local-persistent-storage statistics
Gateway: PGW
Charging local-persistent-storage Statistics
  Batch Messages received                          : 46
  Batch Responses sent                             : 46
  Invalid Messages received                        : 0
  Number of temp log files opened                  : 1
  Number of journal files opened                   : 1
  Number of journal files closed                   : 0
  Number of CDR log files closed                   : 0
  Number of CDR files closed due to file-age       : 0
  Number of CDR files closed due to file-size      : 0
  Number of CDR files closed due to cdr-count      : 0
  Abnormal file closures                           : 0
  Normal file closures                             : 0
  Number of CDR log files closed in TS_32_297 format  : 0
  Number of CDR log files closed in raw asn1 format   : 0
  Total number of CDRs backed up                   : 949
  Disk Full messages sent                          : 0
  Disk Full resolve messages sent                  : 0
  Number of async IO reqs written                  : 46
  Disk space status                                : DISK_AVAILABLE
  Watermark level1 at(MB)                          : 618(70%)
  Watermark level2 at(MB)                          : 706(80%)
  Watermark level3 at(MB)                          : 794(90%)

Temporary CDR log file Statistics
File Name: /opt/mobility/charging/ggsn/temp_log/templog_file_1.log
    Journal file name          : /opt/mobility/charging/ggsn/jrnl/jrnl_1.log
    Current number of CDRs     : 949
    Current file size(bytes)   : 288642
    File age trigger(mins)     : 60
    File size trigger(bytes)   : 10485760
    CDR count trigger          : 0

Global Statistics
  Disk Offline messages sent                       : 0
  Disk Available messages sent                     : 0
  Number of CDR storage files on disk              : 0
```

```
  Current storage space in use(MB)                  : 301
  Available storage space on disk(MB)               : 582
  Total storage space on disk(MB)                   : 883

Mirroring Connection Information
  Connection state                                  : STANDALONE
  Other RE mirroring connection present             : NO
  GRES configured                                   : NO
```

## show unified-edge ggsn-pgw charging path statistics

**Syntax**

**show unified-edge ggsn-pgw charging path statistics**
<**brief | detail**>
<**fpc-slot** *slot-number* **pic-slot** *slot-number*>
<**gateway** *gateway-name*>
<**gtpp-peer-addr** *ipv4-address*>
<**gtpp-peer-name** *peer-name*>

**Release Information**

Command introduced in Junos OS Mobility Release 11.2W.
**gateway-name** option introduced in Junos OS Mobility Release 11.4W.

**Description**

Display the path management message statistics (between the Charging Data Function (CDF) and the Charging Gateway Function (CGF) servers) for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then the statistics for all GGSNs and P-GWs is displayed.

**Options**

**none**—(Same as brief) Display the path management message statistics.

**brief | detail**—(Optional) Display the specified level of output.

The **brief** option displays the statistics per GGSN or P-GW for all services PICs. The **detail** option displays the statistics per GGSN or P-GW for each services PIC.

**fpc-slot** ***slot-number*** **pic-slot** ***slot-number***—(Optional) Display the path management message statistics only for the specified Flexible PIC Concentrator (FPC) slot number and PIC slot number.

**gateway** ***gateway-name***—(Optional) Display the path management statistics for the specified GGSN or P-GW.

**gtpp-peer-addr** ***ipv4-address***—(Optional) Display the path management message statistics only for the GPRS tunneling protocol Prime (GTP Prime) peer with the specified IPv4 address.

**gtpp-peer-name** ***peer-name***—(Optional) Display the path management message statistics only for the GTP Prime peer with the specified name.

**Required Privilege Level**

view

**Related Documentation**

- clear unified-edge ggsn-pgw charging path statistics on page 1197

**List of Sample Output**

show unified-edge ggsn-pgw charging path statistics brief on page 1220
show unified-edge ggsn-pgw charging path statistics detail on page 1220

**Output Fields**

Table 92 on page 1218 lists the output fields for the **show unified-edge ggsn-pgw charging path statistics** command. Output fields are listed in the approximate order in which they appear.

## Table 92: show unified-edge ggsn-pgw charging path statistics Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the GGSN or P-GW. | All levels<br>none |
| **FPC/PIC** | FPC slot number and PIC slot number for which the statistics are displayed. | **detail** |
| **CGF Address** | Address of the CGF server (GTP Prime peer). | All levels<br>none |
| **CGF Server Name** | Name of the CGF server (GTP Prime peer). | All levels<br>none |
| **Echo Requests Rx** | Total number of echo requests received by the CDF from the CGF sever. | All levels<br>none |
| **Echo Responses Tx** | Total number of echo responses transmitted by the CDF to the CGF sever. | All levels<br>none |
| **Echo Responses Rx** | Total number of echo responses received by the CDF from the CGF server. | All levels<br>none |
| **Echo Requests Tx** | Total number of echo requests transmitted by the CDF to the CGF server. | All levels<br>none |
| **Node-Alive Requests Rx** | Total number of node alive requests received by the CDF from the CGF server. | All levels<br>none |
| **Node-Alive Responses Tx** | Total number of responses transmitted by the CDF to the node alive requests received from the CGF server. | All levels<br>none |
| **Version Not Supported Rx** | Total number of Version Not Supported messages received by the CDF from the CGF server. The CGF server sends these messages to the CDF to indicate that the GTP Prime messages sent by the CDF are incompatible with the GTP Prime version supported by the CGF server. | All levels<br>none |
| **Version Not Supported Tx** | Total number of Version Not Supported messages transmitted by the CDF to the CGF server. The CDF sends these messages to indicate that the GTP Prime messages sent by the CGF server are incompatible with the GTP Prime version supported by the CDF. | All levels<br>none |
| **Echo Requests timed out** | Total number of echo requests sent by the CDF for which there were no responses from the CGF server and that have timed out. | All levels<br>none |

Table 92: show unified-edge ggsn-pgw charging path statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Echo Interval** | Configured echo interval, in seconds. If the echo interval is not configured, then the default value is displayed. | All levels<br><br>none |
| **Down Detection Interval** | Configured down detect time, in seconds. If the down detect time is not configured, then the default value is displayed. | All levels<br><br>none |
| **Reconnect Time Interval** | Configured reconnect time, in seconds. If the reconnect time is not configured, then the default value is displayed. | All levels<br><br>none |
| **Destination Port** | Configured destination port. If the destination port is not configured, then the default port (3386) is displayed. | All levels<br><br>none |
| **Pending Queue Size** | Configured pending queue size. If the pending queue size is not configured, then the default value (1024) is displayed. | All levels<br><br>none |
| **Path Manager FPC Slot** | FPC slot that manages the path management messages. | All levels<br><br>none |
| **Path Manager PIC Slot** | PIC slot that manages the path management messages. | All levels<br><br>none |
| **Path Manager Port** | Port used for path management messages. | All levels<br><br>none |
| **T3 Response Time Interval** | Configured T3 response time interval, in seconds. If the T3 response time is not configured, then the default value (5 seconds) is displayed. | All levels<br><br>none |
| **Source Interface Valid** | Indicates whether the source interface is valid or not. | All levels<br><br>none |
| **GTPP Header Type** | Configured header type for the GTP Prime messages. | All levels<br><br>none |
| **N3 Requests** | Configured value for **N3 requests**. If the **N3 requests** value is not configured, then the default value (3) is displayed. | All levels<br><br>none |
| **Local Address** | Address of the local loopback source interface from which the GTP Prime packets are sent to the CGF server. | All levels<br><br>none |

Table 92: show unified-edge ggsn-pgw charging path statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **GTPP Version** | Configured version that is supported on the configured local loopback source interface's IP address, from which the GTP Prime packets are sent to the CGF server. | All levels<br><br>none |
| **Transport Protocol** | Configured transport protocol for sending the GTP Prime packets from CDF to the CGF server. | All levels<br><br>none |
| **TCP Port Range Start** | Start of the range of source ports from which the TCP connection from each services PIC to the CGF server can originate. The GGSN or P-GW assigns a range of source ports internally. | All levels<br><br>none |
| **TCP Port Range End** | End of the range of source ports from which the TCP connection from each services PIC to the CGF server can originate. The GGSN or P-GW assigns a range of source ports internally. | All levels<br><br>none |
| **TCP Connection State** | Indicates whether the TCP connection state on the services PIC has been established or not. | **detail** |

## Sample Output

**show unified-edge ggsn-pgw charging path statistics brief**

```
user@host> show unified-edge ggsn-pgw charging path statistics brief
Gateway: PGW
Charging Path Statistics

  CGF Address               : 2.2.2.2          CGF Server Name           : p_cgf
  Echo Requests           Rx: 0                Echo Responses          Tx: 0
  Echo Responses          Rx: 0                Echo Requests           Tx: 0
  Node-Alive Requests     Rx: 0                Node-Alive Responses    Tx: 0
  Version Not Supported   Rx: 0                Version Not Supported   Tx: 0
  Echo Requests timed out   : 0                Echo Interval             : 0
  Down Detection Interval   : 10               Reconnect Time Interval   : 60
  Destination Port          : 3386             Pending Queue Size        : 1000
  Path Manager FPC Slot     : 5                Path Manager PIC Slot     : 0
  T3 Response Time Interval : 5                Path Manager Port         : 30275
  Source Interface Valid    : Yes              GTPP Header Type          : long
  N3 Requests              : 1               Local Address             : 12.4.1.1

  GTPP Version              : V0               Transport Protocol        : TCP
  TCP Port Range Start      : 30277            TCP Port Range End        : 30308
```

**show unified-edge ggsn-pgw charging path statistics detail**

```
user@host> show unified-edge ggsn-pgw charging path statistics detail
Gateway: PGW
Charging Path Statistics
FPC/PIC: 5/0

  CGF Address               : 2.2.2.2          CGF Server Name           : p_cgf
  Echo Requests           Rx: 0                Echo Responses          Tx: 0
  Echo Responses          Rx: 0                Echo Requests           Tx: 0
  Node-Alive Requests     Rx: 0                Node-Alive Responses    Tx: 0
  Version Not Supported   Rx: 0                Version Not Supported   Tx: 0
  Echo Requests timed out   : 0                Echo Interval             : 0
```

```
Down Detection Interval   : 10              Reconnect Time Interval   : 60
Destination Port          : 3386            Pending Queue Size        : 1000
Path Manager FPC Slot     : 5               Path Manager PIC Slot     : 0
T3 Response Time Interval : 5               Path Manager Port         : 30275
Source Interface Valid    : Yes             GTPP Header Type          : long
N3 Requests              : 1              Local Address            : 12.4.1.1

GTPP Version              : V0              Transport Protocol        : TCP
TCP Port Range Start      : 30277           TCP Port Range End        : 30308
TCP Connection State      : Established
```

## show unified-edge ggsn-pgw charging path status

**Syntax** **show unified-edge ggsn-pgw charging path status**
**<brief | detail>**
**<fpc-slot** ***slot-number*** **pic-slot** ***slot-number*****>**
**<gateway** ***gateway-name*****>**
**<gtpp-peer-addr** ***ipv4-address*****>**
**<gtpp-peer-name** ***peer-name*****>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
**gateway-name** option introduced in Junos OS Mobility Release 11.4W.

**Description** Display the status of the configured GPRS tunneling protocol (GTP) Prime peers for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then the status for all GGSNs and P-GWs is displayed.

The status includes information about whether the GTP Prime peers are connected, down, or still in the process of establishing a connection, and whether the echo messages are enabled or disabled.

NOTE: In charging, the terms GTP Prime peers and charging gateway function (CGF) server are used interchangeably.

**Options** **none**—(Same as brief) Display the status of the configured peers.

**brief | detail**—(Optional) Display the specified level of output.

**fpc-slot** ***slot-number*** **pic-slot** ***slot-number***—(Optional) Display the status of the configured peers only for the specified FPC slot number and PIC slot number.

**gateway** ***gateway-name***—(Optional) Display the path management statistics for the specified GGSN or P-GW.

**gtpp-peer-addr** ***ipv4-address***—(Optional) Display the status of the configured peers only for the GTP Prime peer with the specified IPv4 address.

**gtpp-peer-name** ***peer-name***—(Optional) Display the status of the configured peers only for the GTP Prime peer with the specified name.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge ggsn-pgw charging path statistics on page 1217

**List of Sample Output**
show unified-edge ggsn-pgw charging path status on page 1223
show unified-edge ggsn-pgw charging path status detail on page 1223

**Output Fields** Table 93 on page 1223 lists the output fields for the **show unified-edge ggsn-pgw charging path status** command. Output fields are listed in the approximate order in which they appear.

Table 93: show unified-edge ggsn-pgw charging path status Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the GGSN or P-GW. | All levels<br>none |
| **Peer-Address** | Address of the CGF server (GTP Prime peer). | All levels<br>none |
| **Peer-Name** | Name of the CGF server (GTP Prime peer). | All levels<br>none |
| **Local-Address** | IPv4 address of the local loopback source interface from where the GTP Prime packets are sent to the CGF server (GTP Prime peer). | All levels<br>none |
| **Status** | Status of the CGF server:<br>• **Connected**<br>• **Down**<br>• **In-Progress** | All levels<br>none |
| **Echo** | Indicates whether echo messages are enabled or disabled. The possible values are:<br>• **Enabled** or **Disabled** for UDP connections<br>• **N/A** (Not Applicable) for TCP connections | All levels<br>none |
| **Cause** | Probable cause for the current status of the CGF peer. This field is displayed only when the CGF server is down or the connection has not been established. | **detail** |
| **FPC/PIC** | FPC and PIC slot numbers. | **detail** |

## Sample Output

**show unified-edge ggsn-pgw charging path status**

```
user@host> show unified-edge ggsn-pgw charging path status
Gateway: PGW
Charging Path Status
Peer-Address      Peer-Name      Local-Address      Status          Echo
2.2.2.2           p_cgf          12.4.1.1           Connected       N/A
```

**show unified-edge ggsn-pgw charging path status detail**

```
user@host> show unified-edge ggsn-pgw charging path status detail
Gateway: PGW
Charging Path Status
```

```
FPC/PIC 5/0
Peer-Address   2.2.2.2
Peer-Name      p_cgf
Local-Address  12.4.1.1
Status         Connected
Echo           N/A
```

## show unified-edge ggsn-pgw charging service-mode

**Syntax** **show unified-edge ggsn-pgw charging service-mode gateway *gateway-name***
**<brief | detail>**
**<charging-profile *profile-name*>**
**<transport-profile *profile-name*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Display the charging service mode information for the specified Gateway GPRS Support Node (GGSN) or Packet Data Network Gateway (P-GW).

**Options**

**gateway *gateway-name***—Display the charging service mode information for the specified GGSN or P-GW.

**brief | detail**—(Optional) Display the specified level of output.

**charging-profile-name *profile-name***—(Optional) Display the service mode information for the specified charging profile.

**transport-profile-name *profile-name***—(Optional) Display the service mode information for the specified transport profile.

**Required Privilege Level** view

**List of Sample Output**

show unified-edge ggsn-pgw charging service-mode gateway PGW brief on page 1226
show unified-edge ggsn-pgw charging service-mode gateway PGW detail on page 1227

**Output Fields** Table 94 on page 1225 lists the output fields for the **show unified-edge ggsn-pgw charging service-mode** command. Output fields are listed in the approximate order in which they appear.

### Table 94: show unified-edge ggsn-pgw charging service-mode Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway Name** | Name of the GGSN or P-GW. | All levels |

Table 94: show unified-edge ggsn-pgw charging service-mode Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Service Mode** | Service mode for the gateway. The following service modes are possible:<br>• Maintenance—Gateway is in maintenance mode.<br>• **MM Active Phase**—In this mode, you can make changes to any of the configuration options under the **[edit unified-edge gateways ggsn-pgw *gateway-name* charging charging-profiles]** or the **[edit unified-edge gateways ggsn-pgw *gateway-name* charging transport-profiles**] hierarchy levels.<br>• **MM In/Out Phase**—In this mode, you cannot make changes to the configuration options under the **[edit unified-edge gateways ggsn-pgw *gateway-name* charging charging-profiles]** or the **[edit unified-edge gateways ggsn-pgw *gateway-name* charging transport-profiles**] hierarchy levels.<br>• **Operational**—Gateway is still in operational mode and not in maintenance mode. You can use the following commands to put the charging profile or transport profile in maintenance mode:<br>◦ **set unified-edge gateways ggsn-pgw *gateway-name* charging charging-profiles *profile-name* service-mode maintenance**<br>◦ **set unified-edge gateways ggsn-pgw *gateway-name* charging transport-profiles *profile-name* service-mode maintenance** | All levels |
| **Charging Profile(s)** or **Charging Profile** | Name of the charging profile. | All levels |
| **Service Mode** | Service mode for the charging profile. | All levels |
| **Transport Profile(s)** or **Transport Profile** | Name of the transport profile. | **brief** |
| **Service Mode** | Service mode for the transport profile. | All levels |
| **Pending Maintenance Mode Ready Ack** | Lists the components or modules that are not yet ready to accept the configuration changes. Maintenance mode becomes active only after all the components or modules are ready to accept these changes. | **detail** |

## Sample Output

**show unified-edge ggsn-pgw charging service-mode gateway PGW brief**

```
user@host> show unified-edge ggsn-pgw charging service-mode gateway PGW brief
Maintenance Mode
    MM Active Phase - System is ready to accept configuration changes for all
                      attributes of this object and its sub-hierarchies.
    MM In/Out Phase - System is ready to accept configuration changes only for
                      non-maintenance mode attributes of this object and
                      its sub-hierarchies.
.
Gateway Name    : PGW
Service Mode    : Operational

Charging Profile(s)             Service Mode
p_juniper                       Operational
Transport Profile(s)            Service Mode
```

```
p_tsp                           Operational
```

**show unified-edge ggsn-pgw charging service-mode gateway PGW detail**

```
user@host> show unified-edge ggsn-pgw charging service-mode gateway PGW detail
Gateway Name    : PGW
Service Mode    : Operational

Charging Profile: p_juniper
Service Mode    : Operational
Transport Profile: p_tsp
Service Mode    : Operational
```

## show unified-edge ggsn-pgw charging transfer statistics

**Syntax** **show unified-edge ggsn-pgw charging transfer statistics**
<**brief | detail**>
<**fpc-slot** *slot-number* **pic-slot** *slot-number*>
<**gateway** *gateway-name*>
<**transport-profile-name** *profile-name*>

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
**gateway** option introduced in Junos OS Mobility Release 11.4W.

**Description** Display the transfer statistics for the configured transport profiles on one or more Gateway GPRS Support Nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then statistics for all GGSNs and P-GWs are displayed.

**Options**

**none**—(Same as brief) Display the transfer statistics for the configured transport profiles for all GGSNs or P-GWs.

**brief | detail**—(Optional) Display the specified level of output.

**fpc-slot** ***slot-number*** **pic-slot** ***slot-number***—(Optional) Display the transfer statistics only for the specified FPC slot number and PIC slot number.

**gateway** ***gateway-name*** —(Optional) Display the transfer statistics for the specified GGSN or P-GW.

**transport-profile-name** ***profile-name***—(Optional) Display the transfer statistics only for the specified transport profile.

**Required Privilege Level** view

**Related Documentation**

- clear unified-edge ggsn-pgw charging transfer statistics on page 1198

**List of Sample Output**
show unified-edge ggsn-pgw charging transfer statistics brief on page 1230
show unified-edge ggsn-pgw charging transfer statistics detail on page 1230

**Output Fields** Table 95 on page 1228 lists the output fields for the **show unified-edge ggsn-pgw charging transfer statistics** command. Output fields are listed in the approximate order in which they appear.

### Table 95: show unified-edge ggsn-pgw charging transfer statistics Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the GGSN or P-GW. | All levels<br>none |
| **Transport-Profile** | Name of the transport profile. | All levels<br>none |

Table 95: show unified-edge ggsn-pgw charging transfer statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Redirection Requests Rx** | Total number of redirection request messages received by the charging data function (CDF) from the charging gateway function (CGF) server.<br><br>The CGF server can send these messages to inform CDF about the following:<br><br>• The CGF server is about to stop service (possibly due to an error condition or for maintenance).<br>• The next node in the chain (such as a billing server) has lost its connection to the CGF server. | All levels<br><br>none |
| **Redirection Responses Tx** | Total number of redirection response messages transmitted as responses to the redirection requests received. Redirection response messages indicate whether a redirection request message was successful or not. | All levels<br><br>none |
| **DRT Responses Rx** | Total number of DRT response messages received for the Data Record Transfer (DRT) request messages sent. DRT response messages indicate whether a DRT request was successful or not. | All levels<br><br>none |
| **DRT Requests Tx** | Total number of DRT request messages transmitted to the CGF server. These messages are used to transfer CDRs from the CDF to the CGF server. | All levels<br><br>none |
| **DRT successful Responses Rx** | Total number of successful DRT response messages received for the DRT request messages sent. | All levels<br><br>none |
| **DRT Error Responses Rx** | Total number of DRT error response messages received for the DRT request messages sent. | All levels<br><br>none |
| **DRT Requests timed out** | Total number of DRT requests sent that timed out before receiving any responses from the CGF server. | All levels<br><br>none |
| **CGF Switch Back Times** | Total number of times the CGF servers were switched, which indicates the number of times that the CGF servers were either offline or down for maintenance. | All levels<br><br>none |
| **Batch Requests Tx** | Total number of batch requests transmitted (from services PICs) for a transport profile. | All levels<br><br>none |
| **Batch Response Errors Rx** | Total number of error responses sent by the Routing Engine to the services PICs for the batch requests messages received. | All levels<br><br>none |
| **Batch CDR's Tx** | Total number of CDRs transmitted from services PICs to the Routing Engine. | All levels<br><br>none |
| **CDR Count** | Total number of CDRs transmitted to the CGF server. | All levels<br><br>none |

Table 95: show unified-edge ggsn-pgw charging transfer statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Total WFA** | Total number of request messages awaiting acknowledgements from either the Routing Engine or the CGF server. | All levels<br><br>none |
| **Open Batch Requests Timed out** | Number of open batch requests timed out.<br><br>Batch message requests are sent to write CDRs into local storage. This counter indicates that no response was received and that the request was timed out. | All levels<br><br>none |
| **FPC/PIC** | FPC and PIC slot numbers. | **detail** |

## Sample Output

**show unified-edge ggsn-pgw charging transfer statistics brief**

```
user@host> show unified-edge ggsn-pgw charging transfer statistics brief
Gateway: PGW
Charging Transfer Statistics
Transport-Profile : p_tsp
  Redirection Requests     Rx: 0     Redirection Responses       Tx: 0
  DRT Responses            Rx: 0     DRT Requests                Tx: 0
  DRT successful Responses Rx: 0     DRT Error Responses         Rx: 0
  DRT Requests timed out     : 0     CGF Switch Back Times         : 0
  Batch Requests           Tx: 0     Batch Response Errors       Rx: 0
  Batch CDR's              Tx: 0     CDR Count                     : 0
  Total WFA                  : 0     Open Batch Requests Timed out : 0
```

**show unified-edge ggsn-pgw charging transfer statistics detail**

```
user@host> show unified-edge ggsn-pgw charging transfer statistics detail
Gateway: PGW
Charging Transfer Statistics
FPC/PIC:  3/0
  Transport-profile : p_tsp
    Redirection Requests     Rx: 0     Redirection Responses       Tx: 0
    DRT Responses            Rx: 0     DRT Requests                Tx: 0
    DRT successful Responses Rx: 0     DRT Error Responses         Rx: 0
    DRT Requests timed out     : 0     CGF Switch Back Times         : 0
    Batch Requests           Tx: 0     Batch Response Errors       Rx: 0
    Batch CDR's              Tx: 0     CDR Count                     : 0
    Total WFA                  : 0     Open Batch Requests Timed out : 0
```

## show unified-edge ggsn-pgw charging transfer status

**Syntax** **show unified-edge ggsn-pgw charging transfer status**
**<brief | detail>**
**<fpc-slot** ***slot-number*** **pic-slot** ***slot-number*****>**
**<gateway** ***gateway-name*****>**
**<transport-profile-name** ***profile-name*****>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
**gateway** option introduced in Junos OS Mobility Release 11.4W.

**Description** Display the Charging Data Record (CDR) transfer status for the configured transport profiles for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then the status for all GGSNs and P-GWs is displayed.

**Options** **none**—(Same as brief) Display the total number of unacknowledged and buffered CDRs for the configured transport profiles for all GGSNs or P-GWs.

**brief | detail**—(Optional) Display the specified level of output.

**fpc-slot** ***slot-number*** **pic-slot** ***slot-number***—(Optional) Display the total number of unacknowledged and buffered CDRs only for the specified FPC slot number and PIC slot number.

**gateway** ***gateway-name***—(Optional) Display the total number of unacknowledged and buffered CDRs for the configured transport profiles for the specified GGSN or P-GW.

**transport-profile-name** ***profile-name***—(Optional) Display the total number of unacknowledged and buffered CDRs only for the specified transport profile.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge ggsn-pgw charging transfer statistics on page 1228

**List of Sample Output** show unified-edge ggsn-pgw charging transfer status on page 1232
show unified-edge ggsn-pgw charging transfer status detail on page 1232

**Output Fields** Table 96 on page 1231 lists the output fields for the **show unified-edge ggsn-pgw charging transfer status** command. Output fields are listed in the approximate order in which they appear.

### Table 96: show unified-edge ggsn-pgw charging transfer status Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the GGSN or P-GW | All levels<br><br>none |

Table 96: show unified-edge ggsn-pgw charging transfer status Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **FPC/PIC** | FPC and PIC slot numbers. | **detail** |
| **Transport-Profile** | Name of the transport profile. | All levels<br>none |
| **Transport-profile Id** | ID of the transport profile. | **detail** |
| **Total UnAck CDR's** | Total number of CDRs (for the transport profile) sent to the charging gateway function (CGF) servers for which no acknowledgements were received. | All levels<br>none |
| **Total Buffered CDR's** | Total number of buffered CDRs (for the transport profile) in the services PICs. | All levels<br>none |

## Sample Output

**show unified-edge ggsn-pgw charging transfer status**

```
user@host> show unified-edge ggsn-pgw charging transfer status
Gateway: PGW
Charging Transfer Status
Transport-Profile : p_tsp
  Total UnAck CDR's         : 2
  Total Buffered CDR's      : 0

Transport-Profile : 2
  Total UnAck CDR's         : 0
  Total Buffered CDR's      : 0

Gateway: PGW2
Charging Transfer Status
Transport-Profile : p_tsp
  Total UnAck CDR's         : 5
  Total Buffered CDR's      : 0

Transport-Profile : 2
  Total UnAck CDR's         : 0
  Total Buffered CDR's      : 0
```

**show unified-edge ggsn-pgw charging transfer status detail**

```
user@host> show unified-edge ggsn-pgw charging transfer status detail
Gateway: PGW
Charging Transfer Status
  FPC/PIC: 2/0
  Transport-profile         : p_tsp
  Transport-profile Id      : 3
  Total UnAck CDR's         : 2
  Total Buffered CDR's      : 0

  Transport-profile         : 2
  Transport-profile Id      : 1
  Total UnAck CDR's         : 0
  Total Buffered CDR's      : 0
```

```
Gateway: PGW2
Charging Transfer Status
  FPC/PIC: 2/1
  Transport-profile         : p_tsp
  Transport-profile Id      : 6
  Total UnAck CDR's         : 5
  Total Buffered CDR's      : 0

  Transport-profile         : 2
  Transport-profile Id      : 4
  Total UnAck CDR's         : 0
  Total Buffered CDR's      : 0
```

## show unified-edge ggsn-pgw charging trigger-profile

**Syntax** **show unified-edge ggsn-pgw charging trigger-profile**
<gateway *gateway*>
<**trigger-profile-name** *profile-name*>

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W. gateway argument introduced in Junos OS Mobility Release 11.4W.

**Description** Display the configuration of the trigger profiles for one or more Gateway GPRS Support Nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then information for all GGSNs and P-GWs is displayed.

**Options** **none**—Display the configuration of the trigger profiles.

**gateway** ***gateway***—(Optional) Display the configuration of the trigger profiles for the total number of unacknowledged and buffered CDRs for the configured transport profiles for the specified gateway.

**trigger-profile-name** ***profile-name***—(Optional) Display the configuration only for the specified trigger profile.

**Required Privilege Level** view

**Related Documentation**
- trigger-profiles on page 891

**List of Sample Output** show unified-edge ggsn-pgw charging trigger-profile on page 1235

**Output Fields** Table 97 on page 1234 lists the output fields for the **show unified-edge ggsn-pgw charging trigger-profile** command. Output fields are listed in the approximate order in which they appear.

### Table 97: show unified-edge ggsn-pgw charging trigger-profile Output Fields

| Field Name | Field Description |
|---|---|
| **Profile Name** | Name of the trigger profile. |
| **Profile ID** | ID of the trigger profile. |
| **Time Limit** | Time limit for the trigger profile, if any. |
| **Volume Limit** | Volume limit for the trigger profile, if any. |
| **PLMN change trigger** | Indicates whether the Public Land Mobile Network (PLMN) change trigger is enabled or not.<br><br>If this trigger is enabled, a PLMN change usually results in the CDR being updated with the charging information and then closed. |

Table 97: show unified-edge ggsn-pgw charging trigger-profile Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **QOS change trigger** | Indicates whether the quality-of-service (QoS) change trigger is enabled or not.<br><br>If this trigger is enabled, a QoS change usually results in a container being added to the CDR. |
| **RAT change trigger** | Indicates whether the Radio Access Technology (RAT) change trigger is enabled or not.<br><br>If this trigger is enabled, a RAT change usually results in the CDR being updated with the charging information and then closed. |
| **SGSN/SGW change trigger** | Indicates whether the Serving GPRS Support Node (SGSN) or Serving Gateway (S-GW) change trigger is enabled or not.<br><br>If this trigger is enabled, then for each change, the SGSN or S-GW address is recorded in the CDR. |
| **User location change trigger** | Indicates whether the user-location change trigger is enabled or not.<br><br>If this trigger is enabled, a user location change usually results in the current container being closed and added to the CDR. |
| **MS Timezone change trigger** | Indicates whether the mobile station (MS) time zone change trigger is enabled or not.<br><br>If this trigger is enabled, an MS time zone change usually results in the CDR being updated with the charging information and then closed. |

## Sample Output

**show unified-edge ggsn-pgw charging trigger-profile**

```
user@host> show unified-edge ggsn-pgw charging trigger-profile
Gateway Name: PGW
Profile Name: p_tp
Profile ID  : 1
Profile Name: p_tp
Profile ID  : 1
Time Limit: None
Volume Limit: 1024 Byte (Uplink and Downlink Combined)
PLMN change trigger: Enabled
QOS change trigger : Enabled
RAT change trigger : Enabled
SGSN/SGW change trigger : Enabled
User location change trigger: Enabled
MS Timezone change trigger: Enabled
```

## show unified-edge sgw charging global statistics

**Syntax** show unified-edge sgw charging global statistics
<brief | detail>
<fpc-slot *slot-number* pic-slot *slot-number*>
<gateway *gateway-name*>

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the global statistics for charging for one or more Serving Gateways (S-GWs). If an S-GW is not specified, then the statistics for all S-GWs are displayed.

**Options** **none**—(Same as brief) Display the global statistics for charging, in brief.

**brief | detail**—(Optional) Display the specified level of output.
The **brief** option displays the statistics per GGSN or P-GW for all services PICs. The **detail** option displays the statistics per GGSN or P-GW for each services PIC.

**fpc-slot *slot-number* pic-slot *slot-number***—(Optional) Display the global statistics for charging only for the specified FPC slot number and PIC slot number.

**gateway *gateway-name***—(Optional) Display the global statistics for charging for the specified GGSN or P-GW.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge sgw charging local-persistent-storage statistics on page 1239
- show unified-edge sgw charging path statistics on page 1245
- show unified-edge sgw charging transfer statistics on page 1255

**List of Sample Output**
show unified-edge sgw charging global statistics brief on page 1237
show unified-edge sgw charging global statistics detail on page 1237

**Output Fields** Table 98 on page 1236 lists the output fields for the **show unified-edge sgw charging global statistics** command. Output fields are listed in the approximate order in which they appear.

### Table 98: show unified-edge sgw charging global statistics Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the S-GW. | All levels<br><br>none |
| **FPC/PIC** | FPC slot number and PIC slot number for which the statistics are displayed. | **detail** |

Table 98: show unified-edge sgw charging global statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **CDR Send Errors** | Number of CDR send errors. This counter indicates an internal error while closing the CDR. | All levels<br><br>none |
| **CDR Encode Errors** | Number of CDR encoding failures. For example, if the buffer is insufficient then the CDR encoding does not take place. | All levels<br><br>none |
| **CDR Alloc Failures** | Number of CDR allocation failures. For example, if there is insufficient memory then the CDR allocation can fail. | All levels<br><br>none |
| **Container Failures** | Number of internal failures pertaining to charging containers. | All levels<br><br>none |
| **Charging Bearers Created** | Number of bearers for which charging is enabled. | All levels<br><br>none |
| **Charging Bearers Destroyed** | Number of charging bearers destroyed. | All levels<br><br>none |

## Sample Output

**show unified-edge sgw charging global statistics brief**

```
user@host> show unified-edge sgw charging global statistics brief
Gateway: SGW
Charging Global Statistics

  CDR Send Errors                       : 2
  CDR Encode Errors                     : 0
  CDR Alloc Failures                    : 2
  Container Failures                    : 0
  Charging Bearers Created              : 133
  Charging Bearers Destroyed            : 14
```

**show unified-edge sgw charging global statistics detail**

```
user@host> show unified-edge sgw charging global statistics detail
Gateway: SGW
Charging Global Statistics
  FPC/PIC: 1/1
  CDR Send Errors                       : 2
  CDR Encode Errors                     : 0
  CDR Alloc Failures                    : 2
  Container Failures                    : 0
  Charging Bearers Created              : 100
  Charging Bearers Destroyed            : 10

  FPC/PIC: 3/1
  CDR Send Errors                       : 0
  CDR Encode Errors                     : 0
  CDR Alloc Failures                    : 0
```

```
Container Failures                    : 0
Charging Bearers Created              : 33
Charging Bearers Destroyed            : 4
```

## show unified-edge sgw charging local-persistent-storage statistics

**Syntax** **show unified-edge sgw charging local-persistent-storage statistics <gateway *gateway*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the storage statistics of the Charging Data Record (CDR) files on the local Routing Engine disk for the Serving Gateways (S-GWs). If a gateway name is not specified, then the status for all S-GWs is displayed.

**Options** **none**—Display the storage statistics for all S-GWs.

**gateway *gateway***—(Optional) Display the storage statistics for the specified gateway.

**Required Privilege Level** view

**Related Documentation**
- clear unified-edge sgw charging local-persistent-storage statistics on page 1201

**List of Sample Output** show unified-edge sgw charging local-persistent-storage statistics on page 1243

**Output Fields** Table 99 on page 1239 lists the output fields for the **show unified-edge sgw charging local-persistent-storage statistics** command. Output fields are listed in the approximate order in which they appear.

### Table 99: show unified-edge sgw charging local-persistent-storage statistics Output Fields

| Field Name | Field Description |
|---|---|
| **Batch Messages received** | Total number of batch messages sent from services PICs to the Routing Engine disk. CDRs generated in services PICs are sent to the local Routing Engine disk as batch messages. |
| **Batch Responses sent** | Total number of responses sent to the batch messages received. |
| **Invalid Messages received** | Total number of invalid batch messages sent from services PICs to the Routing Engine disk. |
| **Number of temp log files opened** | Total number of temporary CDR files opened on the Routing Engine disk.<br><br>These files are closed and copied from the temporary location to a final location (**/opt/mobility/charging/ggsn/final_log**) within the same Routing Engine disk from where the files can be transferred using SSH FTP (SFTP). Files are closed when the file size, file age, or the maximum number of CDRs added to the file reaches the configured limit (or the default limit, if the limit is not configured). |

Table 99: show unified-edge sgw charging local-persistent-storage statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Number of journal files opened** | Total number of open journal files. Journal files are used to remove any unfinished file writes from the temporary log files if a daemon or router crash interrupts the kernel file write. When the daemon or router come back up, the journal log files are read to ensure that the contents of the temporary log file are sane. If there is any unfinished CDR data, the temporary log file is truncated to the last-known successful file write. For each temporary log CDR file, a separate journal file is opened. |
| **Number of journal files closed** | Total number of journal files closed. |
| **Number of CDR log files closed** | Total number of temporary CDR log files closed.<br>Authorized users can use SFTP to transfer these files from the **/opt/mobility/charging/ggsn/final_log** location. |
| **Number of CDR files closed due to file-age** | Total number of temporary CDR log files closed because the age of the files reached the configured limit (or the default limit, if the limit is not configured).<br><br>The default file age is 120 minutes. |
| **Number of CDR files closed due to file-size** | Total number of temporary CDR log files closed because the size of the files reached the configured limit (or the default limit, if the limit is not configured).<br><br>The default file size is 10 megabytes (MB). |
| **Number of CDR files closed due to cdr-count** | Total number of temporary CDR log files closed because the maximum number of CDRs added to the files reached the configured limit.<br><br>There is no default limit. |
| **Abnormal file closures** | Total number of abnormal temporary CDR log file closures. This counter is incremented when the charging daemon comes up after a system reboot or crash and temporary CDR log file closures are triggered. |
| **Normal file closures** | Total number of temporary CDR log file closures. This counter is incremented when changes in the configuration, such as a change in the file format, trigger temporary CDR log file closures. |
| **Number of CDR log files closed in TS_32_297 format** | Total number of closed temporary CDR log files that are compliant with the format specified in the 32297 technical specification release. |
| **Number of CDR log files closed in raw asn1 format** | Total number of closed temporary CDR log files that are in the raw ASN1 format. |
| **Total number of CDRs backed up** | Total number of CDRs backed up to the standby Routing Engine. |

Table 99: show unified-edge sgw charging local-persistent-storage statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Disk Full messages sent** | Total number of messages sent by the Routing Engine to the services PICs to indicate that its disk is already full and is unable to accept any more charging data.<br><br>Use SFTP to transfer the files from the **/opt/mobility/charging/ggsn/final_log** location to free disk space, or remove the disk and copy the files.<br><br>You can remove the disk by issuing the following commands in this order:<br><br>• **request system storage unified-edge charging media stop**<br>• **request system storage unified-edge media eject** |
| **Disk Full resolve messages sent** | Total number of disk full resolve messages sent. When the disk space is freed, the Routing Engine sends messages to the services PICs indicating that it can receive charging data. |
| **Number of async IO reqs written** | Number of asynchronous I/O requests written. This counter is incremented once for every write operation into the temporary log CDR file. |
| **Disk space status** | Indicates whether disk space is available for storage. The possible values are:<br><br>• **DISK_AVAILABLE**<br>• **DISK_AT_WATERMARK_LEVEL1**<br>• **DISK_AT_WATERMARK_LEVEL2**<br>• **DISK_AT_WATERMARK_LEVEL3**<br>• **DISK_OFFLINE**—Indicates that a disk is not present or the **request system storage unified-edge charging media stop** command has been issued.<br>• **DISK_OFFLINE_PENDING**—Indicates whether any CDRs are being written or mirrored on the backup Routing Engine. This interim status message is displayed after the **request system storage unified-edge charging media stop** command has been issued but before the disk goes offline. |
| **Watermark level1 at (MB)** | Indicates the percentage of the total Routing Engine disk space configured for storage. By default, watermark level 1 is set to 70 percent of the total disk space.<br><br>When this limit is reached, an alert (if configured) is sent and you can take corrective measures to free the disk space. |
| **Watermark level2 at (MB)** | Indicates the percentage of the total Routing Engine disk space for storage. By default, watermark level 2 is set to 80 percent of the total disk space.<br><br>When this limit is reached, an alert (if configured) is sent and you can take corrective measures to free the disk space. |

Table 99: show unified-edge sgw charging local-persistent-storage statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Watermark level3 at (MB)** | Indicates the percentage of the total Routing Engine disk space configured for storage. By default, watermark level 3 is set to 90 percent of the total disk space.<br><br>When this limit is reached, an alert (if configured) is sent and you can to take any corrective measures to free the disk space. Otherwise, the services PICs stop sending the charging data to the Routing Engine disk and you must transfer the files via SFTP to free the disk space. However, the charging data is not lost because it is buffered in the services PICs. Services PICs can buffer up to a maximum of 2 GB of data after which a call admission control (CAC) is triggered. |
| **Temporary CDR log file Statistics**<br><br>NOTE: The information about temporary CDR log files is displayed only if temporary CDR log files are currently open. | |
| **File Name** | Name of the temporary CDR log file. |
| **Journal file name** | Name of the journal file. |
| **Current number of CDRs** | Total number of CDRs currently added to the temporary CDR log file. |
| **Current file size (bytes)** | Current size, in bytes, of the temporary CDR log file. |
| **File age trigger (mins)** | Configured duration, in minutes, after which the temporary CDR log file is closed, in minutes. If this parameter is not configured, then the default value is displayed. |
| **File size trigger (bytes)** | Configured size, in bytes, that the temporary CDR log file can reach after which it is closed. If this parameter is not configured, then the default value is displayed. |
| **CDR count trigger** | Configured maximum number of CDRs that can be added to the temporary CDR log file, after which it is closed. If this parameter is not configured, then the default value is displayed. |
| Global Statistics | |
| **Disk Offline messages sent** | Total number of messages sent by the Routing Engine to the services PICs to indicate that its disk is offline or is not mounted, and that it is unable to accept any more charging data.<br><br>You can configure the disk (storage media) to store charging data by issuing these commands:<br><br>• **request system storage unified-edge media prepare**<br>• **request system storage unified-edge charging media start** |
| **Disk Available messages sent** | When the disk is prepared and mounted, the Routing Engine sends messages to the services PICs to indicate that it can now receive charging data. This field indicates the total number of these messages sent. |

Table 99: show unified-edge sgw charging local-persistent-storage statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Number of CDR storage files on disk** | Total number of CDR files stored on the local Routing Engine disk. |
| **Current storage space in use (MB)** | Storage space, in MB, that is currently being used. |
| **Available storage space on disk (MB)** | Total free space, in MB, available for storage on the disk. |
| **Total storage space on disk (MB)** | Total storage space, in MB, on the disk. |
| **Mirroring Connection Information** | |
| **Connection state** | State of the mirroring connection. The following states are possible:<br>• **Active**—Indicates that the mirroring status on Routing Engine is active.<br>• **Standalone**—Indicates that the backup Routing Engine is down, or that graceful Routing Engine switchover (GRES) is not configured.<br>• **Standby**—Indicates that the backup Routing Engine is on standby. |
| **Other RE mirroring connection present** | Indicates whether the mirroring connection is established with the other Routing Engine or not |
| **GRES configured** | Indicates whether graceful Routing Engine switchover (GRES) is configured or not. |

## Sample Output

**show unified-edge sgw charging local-persistent-storage statistics**

```
user@host> show unified-edge sgw charging local-persistent-storage statistics
Gateway: SGW
Charging local-persistent-storage Statistics
  Batch Messages received                          : 76
  Batch Responses sent                             : 76
  Invalid Messages received                        : 0
  Number of temp log files opened                  : 1
  Number of journal files opened                   : 1
  Number of journal files closed                   : 0
  Number of CDR log files closed                   : 0
  Number of CDR files closed due to file-age       : 0
  Number of CDR files closed due to file-size      : 0
  Number of CDR files closed due to cdr-count      : 0
  Abnormal file closures                           : 0
  Normal file closures                             : 0
  Number of CDR log files closed in TS_32_297 format  : 0
  Number of CDR log files closed in raw asn1 format   : 0
  Total number of CDRs backed up                   : 2095
  Disk Full messages sent                          : 0
  Disk Full resolve messages sent                  : 0
  Number of async IO reqs written                  : 76
  Disk space status                                : DISK_AVAILABLE
  Watermark level1 at(MB)                          : 618(70%)
  Watermark level2 at(MB)                          : 707(80%)
  Watermark level3 at(MB)                          : 795(90%)
```

```
Temporary CDR log file Statistics
File Name: /opt/mobility/charging/ggsn/temp_log/templog_file_1.log
    Journal file name          : /opt/mobility/charging/ggsn/jrnl/jrnl_1.log
    Current number of CDRs     : 2095
    Current file size(bytes)   : 553028
    File age trigger(mins)     : 60
    File size trigger(bytes)   : 10485760
    CDR count trigger          : 0

Global Statistics
  Disk Offline messages sent                        : 0
  Disk Available messages sent                      : 0
  Number of CDR storage files on disk               : 0
  Current storage space in use(MB)                  : 301
  Available storage space on disk(MB)               : 583
  Total storage space on disk(MB)                   : 884

Mirroring Connection Information
  Connection state                                  : ACTIVE
  Other RE mirroring connection present             : YES
  GRES configured                                   : NO
```

## show unified-edge sgw charging path statistics

**Syntax**

**show unified-edge sgw charging path statistics**
<**brief | detail**>
<**fpc-slot** *slot-number*>
<**gateway-name** *name*>
<**gtpp-peer-addr** *ipv4-address*>
<**gtpp-peer-name** *peer-name*>
<**pic-slot** *slot-number*>

**Release Information**

Command introduced in Junos OS Mobility Release 11.4W.

**Description**

Display the path management message statistics (between the charging data function [CDF] and the charging gateway function [CGF] servers) on one or more Serving Gateways (S-GWs). If a gateway name is not specified, then the path management statistics for all S-GWs are displayed.

**Options**

**none**—(Same as brief) Display the path management message statistics for all S-GWs.

**brief | detail**—(Optional) Display the specified level of output.

The **brief** option displays the statistics per S-GW for all services PICs. The **detail** option displays the statistics per S-GW for each services PIC.

**fpc-slot** ***slot-number***—(Optional) Display the path management message statistics for the specified FPC slot number.

**gateway-name** ***name***—(Optional) Display the path management message statistics for the specified gateway.

**gtpp-peer-addr** ***ipv4-address***—(Optional) Display the path management message statistics for the GTP Prime peer with the specified IPv4 address.

**gtpp-peer-name** ***peer-name***—(Optional) Display the path management message statistics for the GTP Prime peer with the specified name.

**pic-slot** ***slot-number***—(Optional) Display the path management message statistics for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**Required Privilege Level**

view

**Related Documentation**

- clear unified-edge sgw charging path statistics on page 1202
- show unified-edge sgw charging path status on page 1250

**List of Sample Output**

show unified-edge sgw charging path statistics brief on page 1247
show unified-edge sgw charging path statistics detail on page 1248

**Output Fields** Table 100 on page 1246 lists the output fields for the **show unified-edge sgw charging path statistics** command. Output fields are listed in the approximate order in which they appear.

Table 100: show unified-edge sgw charging path statistics Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the S-GW. | All levels |
| Charging Path Statistics | | |
| **FPC/PIC** | FPC slot number and PIC slot number for which the statistics are displayed. | **detail** |
| **CGF Address** | Address of the CGF server (GTP Prime peer). | All levels |
| **CGF Server Name** | Name of the CGF server (GTP Prime peer). | All levels |
| **Echo Requests Rx** | Total number of echo requests received by the CDF from the CGF server. | All levels |
| **Echo Responses Tx** | Total number of echo responses transmitted by the CDF to the CGF server. | All levels |
| **Echo Responses Rx** | Total number of echo responses received by the CDF from the CGF server. | All levels |
| **Echo Requests Tx** | Total number of echo requests transmitted by the CDF to the CGF server. | All levels |
| **Node-Alive Requests Rx** | Total number of node alive requests received by the CDF from the CGF server. | All levels |
| **Node-Alive Responses Tx** | Total number of responses transmitted by the CDF to the node alive requests received from the CGF server. | All levels |
| **Version Not Supported Rx** | Total number of Version Not Supported messages received by the CDF from the CGF server. The CGF server sends these messages to the CDF to indicate that the GTP Prime messages sent by the CDF are incompatible with the GTP Prime version supported by the CGF server. | All levels |
| **Version Not Supported Tx** | Total number of Version Not Supported messages transmitted by the CDF to the CGF server. The CDF sends these messages to indicate that the GTP Prime messages sent by the CGF server are incompatible with the GTP Prime version supported by the CDF. | All levels |
| **Echo Requests timed out** | Total number of echo requests sent by the CDF for which there were no responses from the CGF server and that have timed out. | All levels |
| **Echo Interval** | Configured echo interval, in seconds. If the echo interval is not configured, then the default value is displayed. | All levels |
| **Down Detection Interval** | Configured down detect time, in seconds. If the down detect time is not configured, then the default value is displayed. | All levels |
| **Reconnect Time Interval** | Configured reconnect time, in seconds. If the reconnect time is not configured, then the default value is displayed. | All levels |

Table 100: show unified-edge sgw charging path statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Destination Port** | Configured destination port. If the destination port is not configured, then the default port (3386) is displayed. | All levels |
| **Pending Queue Size** | Configured pending queue size. If the pending queue size is not configured, then the default value (1024) is displayed. | All levels |
| **Path Manager FPC Slot** | FPC slot that manages the path management messages. | All levels |
| **Path Manager PIC Slot** | PIC slot that manages the path management messages. | All levels |
| **Path Manager Port** | Port used for path management messages. | All levels |
| **T3 Response Time Interval** | Configured T3 response time interval, in seconds. If the T3 response time interval is not configured, then the default value (5 seconds) is displayed. | All levels |
| **Source Interface Valid** | Indicates whether the source interface is valid or not. | All levels |
| **GTPP Header Type** | Configured header type for the GTP Prime messages. | All levels |
| **N3 Requests** | Configured value for **N3 requests**. If the **N3 requests** is not configured, then the default value (3) is displayed. | All levels |
| **Local Address** | Address of the local loopback source interface from which the GTP Prime packets are sent to the CGF server. | All levels |
| **GTPP Version** | Configured version that is supported on the configured local loopback source interface's IP address, from which the GTP Prime packets are sent to the CGF server. | All levels |
| **Transport Protocol** | Configured transport protocol for sending the GTP Prime packets from CDF to the CGF server. | All levels |
| **TCP Port Range Start** | Start of the range of source ports from which the TCP connection from each services PIC to the CGF server can originate. The S-GW assigns a range of source ports internally. | All levels |
| **TCP Port Range End** | End of the range of source ports from which the TCP connection from each services PIC to the CGF server can originate. The S-GW assigns a range of source ports internally. | All levels |
| **TCP Connection State** | Indicates whether the TCP connection state on the services PIC has been established or not. | **detail** |

## Sample Output

**show unified-edge sgw charging path statistics brief**

```
user@host> show unified-edge sgw charging path statistics brief
Gateway: SGW
Charging Path Statistics
```

```
  CGF Address               : 2.2.2.2        CGF Server Name           : s_cgf
  Echo Requests          Rx: 0               Echo Responses         Tx: 0
  Echo Responses         Rx: 0               Echo Requests          Tx: 0
  Node-Alive Requests    Rx: 0               Node-Alive Responses   Tx: 0
  Version Not Supported  Rx: 0               Version Not Supported  Tx: 0
  Echo Requests timed out   : 0             Echo Interval             : 0
  Down Detection Interval   : 10            Reconnect Time Interval   : 60
  Destination Port          : 3386          Pending Queue Size        : 1000
  Path Manager FPC Slot     : 2             Path Manager PIC Slot     : 0
  T3 Response Time Interval : 5             Path Manager Port         : 30275
  Source Interface Valid    : Yes           GTPP Header Type          : long
  N3 Requests               : 1             Local Address             : 13.4.1.1

  GTPP Version              : V0            Transport Protocol        : TCP
  TCP Port Range Start      : 30277         TCP Port Range End        : 30308

Gateway: SGW2
Charging Path Statistics

  CGF Address               : 2.2.2.2        CGF Server Name           : s_cgf
  Echo Requests          Rx: 0               Echo Responses         Tx: 0
  Echo Responses         Rx: 0               Echo Requests          Tx: 0
  Node-Alive Requests    Rx: 0               Node-Alive Responses   Tx: 0
  Version Not Supported  Rx: 0               Version Not Supported  Tx: 0
  Echo Requests timed out   : 0             Echo Interval             : 0
  Down Detection Interval   : 10            Reconnect Time Interval   : 60
  Destination Port          : 3386          Pending Queue Size        : 1000
  Path Manager FPC Slot     : 2             Path Manager PIC Slot     : 1
  T3 Response Time Interval : 5             Path Manager Port         : 30241
  Source Interface Valid    : Yes           GTPP Header Type          : long
  N3 Requests               : 1             Local Address             : 12.4.1.1

  GTPP Version              : V0            Transport Protocol        : TCP
  TCP Port Range Start      : 30243         TCP Port Range End        : 30274
```

### show unified-edge sgw charging path statistics detail

```
user@host> show unified-edge sgw charging path statistics detail
Gateway: SGW
Charging Path Statistics
FPC/PIC: 2/0

  CGF Address               : 2.2.2.2        CGF Server Name           : s_cgf
  Echo Requests          Rx: 0               Echo Responses         Tx: 0
  Echo Responses         Rx: 0               Echo Requests          Tx: 0
  Node-Alive Requests    Rx: 0               Node-Alive Responses   Tx: 0
  Version Not Supported  Rx: 0               Version Not Supported  Tx: 0
  Echo Requests timed out   : 0             Echo Interval             : 0
  Down Detection Interval   : 10            Reconnect Time Interval   : 60
  Destination Port          : 3386          Pending Queue Size        : 1000
  Path Manager FPC Slot     : 2             Path Manager PIC Slot     : 0
  T3 Response Time Interval : 5             Path Manager Port         : 30275
  Source Interface Valid    : Yes           GTPP Header Type          : long
  N3 Requests               : 1             Local Address             : 13.4.1.1

  GTPP Version              : V0            Transport Protocol        : TCP
  TCP Port Range Start      : 30277         TCP Port Range End        : 30308
  TCP Connection State      : Established
FPC/PIC: 5/0

  CGF Address               : 2.2.2.2        CGF Server Name           : s_cgf
  Echo Requests          Rx: 0               Echo Responses         Tx: 0
```

```
  Echo Responses          Rx: 0              Echo Requests           Tx: 0
  Node-Alive Requests     Rx: 0              Node-Alive Responses    Tx: 0
  Version Not Supported   Rx: 0              Version Not Supported   Tx: 0
  Echo Requests timed out   : 0              Echo Interval             : 0
  Down Detection Interval   : 10             Reconnect Time Interval   : 60
  Destination Port          : 3386           Pending Queue Size        : 1000
  Path Manager FPC Slot     : 2              Path Manager PIC Slot     : 0
  T3 Response Time Interval : 5              Path Manager Port         : 30275
  Source Interface Valid    : Yes            GTPP Header Type          : long
  N3 Requests              : 1             Local Address             : 13.4.1.1

  GTPP Version              : V0             Transport Protocol        : TCP
  TCP Port Range Start      : 30277          TCP Port Range End        : 30308
  TCP Connection State      : Not Established

Gateway: SGW2
Charging Path Statistics
FPC/PIC: 2/1

  CGF Address               : 2.2.2.2        CGF Server Name           : s_cgf
  Echo Requests           Rx: 0              Echo Responses          Tx: 0
  Echo Responses          Rx: 0              Echo Requests           Tx: 0
  Node-Alive Requests     Rx: 0              Node-Alive Responses    Tx: 0
  Version Not Supported   Rx: 0              Version Not Supported   Tx: 0
  Echo Requests timed out   : 0              Echo Interval             : 0
  Down Detection Interval   : 10             Reconnect Time Interval   : 60
  Destination Port          : 3386           Pending Queue Size        : 1000
  Path Manager FPC Slot     : 2              Path Manager PIC Slot     : 1
  T3 Response Time Interval : 5              Path Manager Port         : 30241
  Source Interface Valid    : Yes            GTPP Header Type          : long
  N3 Requests              : 1             Local Address             : 12.4.1.1

  GTPP Version              : V0             Transport Protocol        : TCP
  TCP Port Range Start      : 30243          TCP Port Range End        : 30274
  TCP Connection State      : Not Established
FPC/PIC: 5/1

  CGF Address               : 2.2.2.2        CGF Server Name           : s_cgf
  Echo Requests           Rx: 0              Echo Responses          Tx: 0
  Echo Responses          Rx: 0              Echo Requests           Tx: 0
  Node-Alive Requests     Rx: 0              Node-Alive Responses    Tx: 0
  Version Not Supported   Rx: 0              Version Not Supported   Tx: 0
  Echo Requests timed out   : 0              Echo Interval             : 0
  Down Detection Interval   : 10             Reconnect Time Interval   : 60
  Destination Port          : 3386           Pending Queue Size        : 1000
  Path Manager FPC Slot     : 2              Path Manager PIC Slot     : 1
  T3 Response Time Interval : 5              Path Manager Port         : 30241
  Source Interface Valid    : Yes            GTPP Header Type          : long
  N3 Requests              : 1             Local Address             : 12.4.1.1

  GTPP Version              : V0             Transport Protocol        : TCP
  TCP Port Range Start      : 30243          TCP Port Range End        : 30274
  TCP Connection State      : Not Established
```

## show unified-edge sgw charging path status

**Syntax**

**show unified-edge sgw charging path status**
**<brief | detail>**
**<fpc-slot *slot-number*>**
**<gateway-name *name*>**
**<gtpp-peer-addr *ipv4-address*>**
**<gtpp-peer-name *peer-name*>**
**<pic-slot *slot-number*>**

**Release Information**

Command introduced in Junos OS Mobility Release 11.4W.

**Description**

Display the status of the configured GPRS tunneling protocol (GTP) Prime peers for the Serving Gateways (S-GWs). If a gateway name is not specified, then the status for all S-GWs is displayed.

The status includes information about whether the GTP Prime peers are connected, down, or still in the process of establishing a connection, and whether the echo messages are enabled or disabled

NOTE: In charging, the terms GTP Prime peers and charging gateway function (CGF) server are used interchangeably.

**Options**

**none**—(Same as brief) Display the status of the configured GTP Prime peers for all S-GWs.

**brief | detail**—(Optional) Display the specified level of output.

**fpc-slot *slot-number***—(Optional) Display the status of the configured GTP Prime peers for the specified FPC slot number.

**gtpp-peer-addr *ipv4-address***—(Optional) Display the status of the GTP Prime peer with the specified IPv4 address.

**gtpp-peer-name *peer-name***—(Optional) Display the status of the GTP Prime peer with the specified name.

**pic-slot *slot-number***—(Optional) Display the status of the configured GTP Prime peers for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**Required Privilege Level**

view

**Related Documentation**

- show unified-edge sgw charging path statistics on page 1245

**List of Sample Output**

show unified-edge sgw charging path status brief on page 1251
show unified-edge sgw charging path status detail on page 1251

**Output Fields** Table 101 on page 1251 lists the output fields for the **show unified-edge sgw charging path status** command. Output fields are listed in the approximate order in which they appear.

### Table 101: show unified-edge sgw charging path status Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the S-GW. | All levels |
| **Peer-Address** | Address of the charging gateway function (CGF) server (GTP Prime peer). | All levels |
| **Peer-Name** | Name of the CGF server (GTP Prime peer). | All levels |
| **Local-Address** | IPv4 address of the local loopback source interface from where the GTP Prime packets are sent to the CGF server (GTP Prime peer). | All levels |
| **Status** | Status of the CGF server:<br>• **Connected**<br>• **Down**<br>• **In-Progress** | All levels |
| **Echo** | Indicates whether echo messages are enabled or disabled. The possible values are:<br>• **Enabled** or **Disabled** for UDP connections<br>• **N/A** (Not Applicable) for TCP connections | All levels |
| **Cause** | Probable cause for the current status of the CGF peer. This field is displayed only when the CGF server is down or the connection has not been established. | **detail** |
| **FPC/PIC** | FPC and PIC slot numbers. | **detail** |

## Sample Output

**show unified-edge sgw charging path status brief**

```
user@host> show unified-edge sgw charging path status brief
Gateway: SGW
Charging Path Status
Peer-Address      Peer-Name       Local-Address      Status          Echo
3.3.3.3           test            13.4.1.1           In-Progress     N/A
2.2.2.2           s_cgf           13.4.1.1           Connected       N/A
```

**show unified-edge sgw charging path status detail**

```
user@host> show unified-edge sgw charging path status detail
Gateway: SGW
Charging Path Status

        FPC/PIC 2/1
        Peer-Address   3.3.3.3
        Peer-Name      test
        Local-Address  13.4.1.1
        Status         Down
        Cause          Server Not Responding
```

```
Echo            N/A

Peer-Address    2.2.2.2
Peer-Name       s_cgf
Local-Address   13.4.1.1
Status          Connected
Echo            N/A
```

## show unified-edge sgw charging service-mode

**Syntax** **show unified-edge sgw charging service-mode gateway-name *gateway-name***
**<brief | detail>**
**<charging-profile-name *profile-name*>**
**<transport-profile-name *profile-name*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the charging service mode information for the specified Serving Gateway (S-GW).

**Options** **gateway-name *gateway-name***—Display the charging service mode information for the specified gateway.

**brief | detail**—(Optional) Display the specified level of output.

**charging-profile-name *profile-name***—(Optional) Display the service mode information for the specified charging profile.

**transport-profile-name *profile-name***—(Optional) Display the service mode information for the specified transport profile.

**Required Privilege Level** view

**List of Sample Output** show unified-edge sgw charging service-mode gateway SGW brief on page 1254
show unified-edge sgw charging service-mode gateway SGW detail on page 1254

**Output Fields** Table 102 on page 1253 lists the output fields for the **show unified-edge sgw charging service-mode** command. Output fields are listed in the approximate order in which they appear.

### Table 102: show unified-edge sgw charging service-mode Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway Name** | Name of the S-GW. | All levels |
| **Service Mode** | Service mode for the gateway. The following service modes are possible:<br>• Operational—Gateway is in operational mode.<br>• Maintenance—Gateway is in maintenance mode.<br>• **MM Active Phase**—In this mode, you can make changes to any of the configuration options under the **[edit unified-edge gateways sgw *gateway-name* charging charging-profiles]** or the **[edit unified-edge gateways sgw *gateway-name* charging transport-profiles]** hierarchy levels.<br>• **MM In/Out Phase**—In this mode, you cannot make changes to the configuration options under the **[edit unified-edge gateways sgw *gateway-name* charging charging-profiles]** or the **[edit unified-edge gateways sgw *gateway-name* charging transport-profiles]** hierarchy levels. | All levels |
| **Charging Profile(s)** or **Charging Profile** | Name of the charging profile. | All levels |

Table 102: show unified-edge sgw charging service-mode Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Service Mode** | Service mode for the charging profile. | All levels |
| **Transport Profile(s)** or **Transport Profile** | Name of the transport profile. | **brief** |
| **Service Mode** | Service mode for the transport profile. | All levels |
| **Pending Maintenance Mode Ready Ack** | Lists the components or modules that are not yet ready to accept the configuration changes. Maintenance mode becomes active only after all the components or modules are ready to accept these changes. | **detail** |

## Sample Output

**show unified-edge sgw charging service-mode gateway SGW brief**

```
user@host> show unified-edge sgw charging service-mode gateway SGW brief
Maintenance Mode
    MM Active Phase - System is ready to accept configuration changes for all
                      attributes of this object and its sub-hierarchies.
    MM In/Out Phase - System is ready to accept configuration changes only for
                      non-maintenance mode attributes of this object and
                      its sub-hierarchies.
.
Gateway Name    : SGW
Service Mode    : Operational

Charging Profile(s)             Service Mode
p_juniper                       Operational
Transport Profile(s)            Service Mode
p_tsp                           Operational
```

**show unified-edge sgw charging service-mode gateway SGW detail**

```
user@host> show unified-edge sgw charging service-mode gateway SGW detail
Gateway Name    : SGW
Service Mode    : Operational

Charging Profile: p_juniper
Service Mode    : Operational
Transport Profile: p_tsp
Service Mode    : Operational
```

## show unified-edge sgw charging transfer statistics

**Syntax**

**show unified-edge sgw charging transfer statistics**
**<brief | detail>**
**<fpc-slot** ***slot-number*****>**
**<gateway-name** ***name*****>**
**<pic-slot** ***slot-number*****>**
**<transport-profile-name** ***profile-name*****>**

**Release Information**

Command introduced in Junos OS Mobility Release 11.4W.

**Description**

Display the transfer statistics for the configured transport profiles on one or more Serving Gateways (S-GWs). If a gateway name is not specified, then the transfer statistics for all S-GWs are displayed.

**Options**

**none**—(Same as brief) Display the transfer statistics for all S-GWs.

**brief | detail**—(Optional) Display the specified level of output.

**fpc-slot** ***slot-number***—(Optional) Display the transfer statistics for the specified FPC slot number.

**gateway-name** ***name***—(Optional) Display the transfer statistics for the specified gateway.

**pic-slot** ***slot-number***—(Optional) Display the transfer statistics for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**transport-profile-name** ***profile-name***—(Optional) Display the transfer statistics for the specified transport profile.

**Required Privilege Level**

view

**Related Documentation**

- clear unified-edge sgw charging transfer statistics on page 1203

**List of Sample Output**

show unified-edge sgw charging transfer statistics brief on page 1257
show unified-edge sgw charging transfer statistics detail on page 1257

**Output Fields**

Table 103 on page 1255 lists the output fields for the **show unified-edge sgw charging transfer statistics** command. Output fields are listed in the approximate order in which they appear.

### Table 103: show unified-edge sgw charging transfer statistics Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the S-GW. | All levels |
| **Transport-Profile** | Name of the transport profile. | All levels |

Table 103: show unified-edge sgw charging transfer statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Redirection Requests Rx** | Total number of redirection request messages received by the charging data function (CDF) from the charging gateway function (CGF) server.<br><br>The CGF server sends these messages to inform the CDF about the following:<br>• The CGF server is about to stop service (possibly due to an error or for maintenance).<br>• The next node in the chain (such as a billing server) has lost its connection to the CGF server. | All levels |
| **Redirection Responses Tx** | Total number of redirection response messages transmitted as responses to the redirection requests received. Redirection response messages indicate whether a redirection request message was successful or not. | All levels |
| **DRT Responses Rx** | Total number of Data Record Transfer (DRT) response messages received for the DRT request messages sent. DRT response messages indicate whether a DRT request was successful or not. | All levels |
| **DRT Requests Tx** | Total number of DRT request messages transmitted to the CGF server. These messages are used to transfer Charging Data Records (CDRs) from the CDF to the CGF server. | All levels |
| **DRT successful Responses Rx** | Total number of successful DRT response messages received for the DRT request messages sent. | All levels |
| **DRT Error Responses Rx** | Total number of DRT error response messages received for the DRT request messages sent. | All levels |
| **DRT Requests timed out** | Total number of DRT requests sent that timed out before receiving a response from the CGF server. | All levels |
| **CGF Switch Back Times** | Total number of times the CGF servers were switched, which indicates the number of times that the CGF servers were either offline or down for maintenance. | All levels |
| **Batch Requests Tx** | Total number of batch requests transmitted from services PICs for a transport profile. | All levels |
| **Batch Response Errors Rx** | Total number of error responses, sent by the Routing Engine to the services PICs, for the batch requests messages received. | All levels |
| **Batch CDR's Tx** | Total number of CDRs transmitted from services PICs to the Routing Engine. | All levels |
| **CDR Count** | Total number of CDRs transmitted to the CGF server. | All levels |
| **Total WFA** | Total number of request messages awaiting acknowledgements from the Routing Engine or the CGF server. | All levels |

Table 103: show unified-edge sgw charging transfer statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Open Batch Requests Timed out** | Number of open batch requests timed out.<br><br>Batch message requests are sent to write CDRs into local storage. This counter indicates that no response was received and that the request was timed out. | All levels<br><br>none |
| **FPC/PIC** | FPC and PIC slot numbers. | **detail** |

## Sample Output

**show unified-edge sgw charging transfer statistics brief**

```
user@host> show unified-edge sgw charging transfer statistics brief
Gateway: SGW
Charging Transfer Statistics
Transport-Profile : trans_p
  Redirection Requests     Rx: 0     Redirection Responses       Tx: 0
  DRT Responses            Rx: 0     DRT Requests                Tx: 0
  DRT successful Responses Rx: 0     DRT Error Responses         Rx: 0
  DRT Requests timed out     : 0     CGF Switch Back Times         : 0
  Batch Requests           Tx: 0     Batch Response Errors       Rx: 0
  Batch CDR's              Tx: 0     CDR Count                     : 0
  Total WFA                  : 0     Open Batch Requests Timed out : 0

Transport-Profile : trans_p2
  Redirection Requests     Rx: 0     Redirection Responses       Tx: 0
  DRT Responses            Rx: 0     DRT Requests                Tx: 0
  DRT successful Responses Rx: 0     DRT Error Responses         Rx: 0
  DRT Requests timed out     : 0     CGF Switch Back Times         : 0
  Batch Requests           Tx: 0     Batch Response Errors       Rx: 0
  Batch CDR's              Tx: 0     CDR Count                     : 0
  Total WFA                  : 0     Open Batch Requests Timed out : 0
```

**show unified-edge sgw charging transfer statistics detail**

```
user@host> show unified-edge sgw charging transfer statistics detail
Gateway: SGW
Charging Transfer Statistics
FPC/PIC:  1/1
  Transport-profile : trans_p
    Redirection Requests     Rx: 0     Redirection Responses       Tx: 0
    DRT Responses            Rx: 0     DRT Requests                Tx: 0
    DRT successful Responses Rx: 0     DRT Error Responses         Rx: 0
    DRT Requests timed out     : 0     CGF Switch Back Times         : 0
    Batch Requests           Tx: 0     Batch Response Errors       Rx: 0
    Batch CDR's              Tx: 0     CDR Count                     : 0
    Total WFA                  : 0     Open Batch Requests Timed out : 0

  Transport-profile : trans_p2
    Redirection Requests     Rx: 0     Redirection Responses       Tx: 0
    DRT Responses            Rx: 0     DRT Requests                Tx: 0
    DRT successful Responses Rx: 0     DRT Error Responses         Rx: 0
    DRT Requests timed out     : 0     CGF Switch Back Times         : 0
    Batch Requests           Tx: 0     Batch Response Errors       Rx: 0
    Batch CDR's              Tx: 0     CDR Count                     : 0
    Total WFA                  : 0     Open Batch Requests Timed out : 0
```

```
FPC/PIC:  3/1
  Transport-profile : trans_p
    Redirection Requests     Rx: 0     Redirection Responses       Tx: 0
    DRT Responses            Rx: 0     DRT Requests                Tx: 0
    DRT successful Responses Rx: 0     DRT Error Responses         Rx: 0
    DRT Requests timed out     : 0     CGF Switch Back Times         : 0
    Batch Requests           Tx: 0     Batch Response Errors       Rx: 0
    Batch CDR's              Tx: 0     CDR Count                     : 0
    Total WFA                  : 0     Open Batch Requests Timed out : 0

  Transport-profile : trans_p2
    Redirection Requests     Rx: 0     Redirection Responses       Tx: 0
    DRT Responses            Rx: 0     DRT Requests                Tx: 0
    DRT successful Responses Rx: 0     DRT Error Responses         Rx: 0
    DRT Requests timed out     : 0     CGF Switch Back Times         : 0
    Batch Requests           Tx: 0     Batch Response Errors       Rx: 0
    Batch CDR's              Tx: 0     CDR Count                     : 0
    Total WFA                  : 0     Open Batch Requests Timed out : 0
```

## show unified-edge sgw charging transfer status

**Syntax** **show unified-edge sgw charging transfer status**
**<brief | detail>**
**<fpc-slot** ***slot-number*****>**
**<gateway-name** ***name*****>**
**<pic-slot** ***slot-number*****>**
**<transport-profile-name** ***profile-name*****>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the Charging Data Record (CDR) transfer status for the transport profiles on one or more Serving Gateways (S-GWs). If a gateway name is not specified, then the transfer status for all S-GWs are displayed.

**Options** **none**—(Same as brief) Display Display the total number of unacknowledged and buffered CDRs for the configured transport profiles for all S-GWs.

**brief | detail**—(Optional) Display the specified level of output.

**fpc-slot** ***slot-number***—(Optional) Display the total number of unacknowledged and buffered CDRs for the configured transport profiles for the specified FPC slot number.

**gateway-name** ***name***—(Optional) Display the total number of unacknowledged and buffered CDRs for the configured transport profiles for the specified gateway.

**pic-slot** ***slot-number***—(Optional) Display the total number of unacknowledged and buffered CDRs for the configured transport profiles for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**transport-profile-name** ***profile-name***—(Optional) Display the total number of unacknowledged and buffered CDRs for the configured transport profiles for the specified transport profile.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge sgw charging transfer statistics on page 1255

**List of Sample Output**
show unified-edge sgw charging transfer status brief on page 1260
show unified-edge sgw charging transfer status detail on page 1260

**Output Fields** Table 104 on page 1259 lists the output fields for the **show unified-edge sgw charging transfer status** command. Output fields are listed in the approximate order in which they appear.

### Table 104: show unified-edge sgw charging transfer status Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the S-GW. | All levels |

Table 104: show unified-edge sgw charging transfer status Output Fields *(continued)*

| | | |
|---|---|---|
| **FPC/PIC** | FPC and PIC slot numbers. | **detail** |
| **Transport-Profile** | Name of the transport profile. | All levels |
| **Transport-profile Id** | ID of the transport profile. | **detail** |
| **Total UnAck CDR's** | Total number of CDRs (for the transport profile) sent to the charging gateway function (CGF) servers for which no acknowledgements were received. | All levels |
| **Total Buffered CDR's** | Total number of buffered CDRs (for the transport profile) in the services PICs. | All levels |

## Sample Output

**show unified-edge sgw charging transfer status brief**

```
user@host> show unified-edge sgw charging transfer status brief
Gateway: SGW
Charging Transfer Status
Transport-Profile : s_tsp
  Total UnAck CDR's         : 0
  Total Buffered CDR's      : 10

Transport-Profile : s_tsp2
  Total UnAck CDR's         : 0
  Total Buffered CDR's      : 0
```

**show unified-edge sgw charging transfer status detail**

```
user@host> show unified-edge sgw charging transfer status detail
Gateway: SGW
Charging Transfer Status
  FPC/PIC: 2/1
  Transport-profile         : s_tsp
  Transport-profile Id      : 1
  Total UnAck CDR's         : 0
  Total Buffered CDR's      : 2

  Transport-profile         : s_tsp2
  Transport-profile Id      : 2
  Total UnAck CDR's         : 0
  Total Buffered CDR's      : 0

  FPC/PIC: 3/1
  Transport-profile         : s_tsp
  Transport-profile Id      : 1
  Total UnAck CDR's         : 0
  Total Buffered CDR's      : 8

  Transport-profile         : s_tsp2
  Transport-profile Id      : 2
  Total UnAck CDR's         : 0
  Total Buffered CDR's      : 0
```

## show unified-edge sgw charging trigger-profile

**Syntax** **show unified-edge ggsn-pgw charging trigger-profile**
**<gateway** *gateway-name***>**
**<trigger-profile-name** *profile-name***>**

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Display the configuration of the trigger profiles for one or more Serving Gateways (S-GWs). If a gateway name is not specified, then information for all S-GWs are displayed.

**Options** **gateway** *gateway-name*—(Optional) Display the trigger profile information for the specified gateway.

**trigger-profile-name** *profile-name*—(Optional) Display the information for the specified trigger profile.

**Required Privilege Level** view

**Related Documentation**
- trigger-profiles on page 891

**List of Sample Output** show unified-edge sgw charging trigger-profile gateway SGW on page 1262

**Output Fields** Table 105 on page 1261 lists the output fields for the **show unified-edge sgw charging trigger-profile** command. Output fields are listed in the approximate order in which they appear.

### Table 105: show unified-edge sgw charging trigger-profile Output Fields

| Field Name | Field Description |
|---|---|
| **Gateway Name** | Name of the S-GW |
| **Profile Name** | Name of the trigger profile. |
| **Profile ID** | ID of the trigger profile. |
| **Time Limit** | The time limit for the trigger profile, if any. |
| **Volume Limit** | The volume limit (in bytes) for the trigger profile, if any. |
| **PLMN change trigger** | Indicates whether the public land mobile network (PLMN) change trigger is enabled or not.<br><br>If this trigger is enabled, a PLMN change usually results in the Charging Data Record (CDR) being updated with the charging information and then closed. |
| **QOS change trigger** | Indicates whether the QoS change trigger is enabled or not.<br><br>If this trigger is enabled, a QoS change usually results in a container being added to the CDR. |

Table 105: show unified-edge sgw charging trigger-profile Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **RAT change trigger** | Indicates whether the RAT change trigger is enabled or not.<br><br>If this trigger is enabled, a RAT change usually results in the CDR being updated with the charging information and then closed. |
| **SGSN/MME change trigger** | Indicates whether the Serving GPRS Support Node (SGSN) or Mobility Management Entity (MME) change trigger is enabled or not.<br><br>If this trigger is enabled, then for each change, the SGSN or MME address is recorded in the CDR. |
| **User location change trigger** | Indicates whether the user-location change trigger is enabled or not.<br><br>If this trigger is enabled, a user location change usually results in the current container being closed and added to the CDR. |
| **MS Timezone change trigger** | Indicates whether the Mobile Station (MS) time zone change trigger is enabled.<br><br>If this trigger is enabled, an MS time zone change usually results in the CDR being updated with the charging information and then closed. |

## Sample Output

**show unified-edge sgw charging trigger-profile gateway SGW**

```
user@host> show unified-edge sgw charging trigger-profile gateway SGW
Gateway Name: SGW
Profile Name: s_tp
Profile ID  : 1
Profile Name: s_tp
Profile ID  : 1
Time Limit: None
Volume Limit: 1024 Byte (Uplink and Downlink Combined)
PLMN change trigger: Enabled
QOS change trigger : Enabled
RAT change trigger : Enabled
SGSN/MME change trigger : Enabled
User location change trigger: Enabled
MS Timezone change trigger: Enabled
```

CHAPTER 33

# Class of Service (CoS) Operational Commands

## show unified-edge ggsn-pgw statistics traffic-class

**Syntax** show unified-edge ggsn-pgw statistics traffic-class (background | conversational | interactive | streaming)
<traffic-handling-priority *traffic-handling-priority*>

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the statistics for the specified traffic class one or more Gateway GPRS Support Nodes (GGSNs) or Packet Data Network Gateways (P-GWs).

**Options**

**traffic-class (background | conversational | interactive | streaming)**—Display the status information for the specified traffic class.

**traffic-handling-priority *traffic-handling-priority***—(Optional) Display the status information for the specified traffic handling priority. You can specify a traffic handling priority value of 1 through 3.

NOTE: This field is applicable only if the traffic class is specified as **interactive.**

**Required Privilege Level** view

**Related Documentation**

- clear unified-edge ggsn-pgw statistics on page 1148
- show unified-edge ggsn-pgw statistics on page 1165

**List of Sample Output**

show unified-edge ggsn-pgw statistics traffic-class interactive on page 1264
show unified-edge ggsn-pgw statistics traffic-class interactive traffic–handling-priority 1 on page 1265

**Output Fields** The output fields for the **show unified-edge ggsn-pgw statistics traffic-class** command are a subset of the output fields for the **show unified-edge ggsn-pgw statistics** command. Please refer to the explanation of the output fields for the **show unified-edge ggsn-pgw statistics** command.

### Sample Output

**show unified-edge ggsn-pgw statistics traffic-class interactive**

```
user@host> show unified-edge ggsn-pgw statistics traffic-class interactive
Gateway: gw1
Control plane statistics:
    Session establishment attempts:             22
    Successful session establishments:          22
    MS/peer initiated session deactivations:    20
    Successful MS/peer initiated deactivations: 20
    Gateway initiated session deactivations:    0
    Successful gateway initiated deactivations: 0
Data plane GTP statistics (Gn/S5/S8):
```

```
    Input     packets:          10
    Input     bytes:            1000
    Output    packets:          10
    Output    bytes:            1168
    Discarded packets:          0
Data plane GTP statistics (Gi):
    Input     packets:          10
    Input     bytes:            1168
    Output    packets:          10
    Output    bytes:            1000
    Discarded packets:          0
```

### show unified-edge ggsn-pgw statistics traffic-class interactive traffic–handling-priority 1

```
user@host> show unified-edge ggsn-pgw statistics traffic-class interactive
traffic–handling-priority 1
Gateway: gw1
Control plane statistics:
    Session establishment attempts:             22
    Successful session establishments:          22
    MS/peer initiated session deactivations:    20
    Successful MS/peer initiated deactivations: 20
    Gateway initiated session deactivations:    0
    Successful gateway initiated deactivations: 0
Data plane GTP statistics (Gn/S5/S8):
    Input     packets:          10
    Input     bytes:            1000
    Output    packets:          10
    Output    bytes:            1168
    Discarded packets:          0
Data plane GTP statistics (Gi):
    Input     packets:          10
    Input     bytes:            1168
    Output    packets:          10
    Output    bytes:            1000
    Discarded packets:          0
```

## show unified-edge ggsn-pgw status preemption-list

**Syntax** **show unified-edge ggsn-pgw status preemption-list**
<brief | detail>
<fpc-slot *fpc-slot*>
<gateway *gateway*>
<pic-slot *pic-slot*>

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
**gateway** option introduced in Junos OS Mobility Release 11.4W.

**Description** Display the preemption list for guaranteed bit rate (GBR) and non-GBR bearers for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then information for all GGSNs and P-GWs is displayed.

NOTE:

- In load conditions, to accommodate higher-priority bearers, lower-priority bearers are preempted. This list displays the number of bearers in each candidate priority level for preemption.
- This command displays a preemption list only if preemption is enabled on the GGSN or P-GW.

**Options** **none**—(Same as brief) Display the preemption list information in brief.

**brief | detail** —(Optional) Display the specified level of output.

**fpc-slot *fpc-slot***—(Optional) Display the preemption list information for the specified Flexible PIC Concentrator (FPC) slot number. You must specify a PIC slot number along with an FPC slot number.

**gateway**—(Optional) Display the preemption list information for the specified GGSN or P-GW.

**pic-slot *pic-slot***—(Optional) Display the status information for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge ggsn-pgw status on page 1168

**List of Sample Output**
show unified-edge ggsn-pgw status preemption-list brief on page 1267
show unified-edge ggsn-pgw status preemption-list detail on page 1267

**Output Fields** Table 106 on page 1267 lists the output fields for the **show unified-edge ggsn-pgw status preemption-list** command. Output fields are listed in the approximate order in which they appear.

Table 106: show unified-edge ggsn-pgw status preemption-list Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of GGSN or P-GW. | All levels |
| **FPC Slot** | FPC slot number of the interface for which the preemption list information is displayed. | **detail** |
| **PIC Slot** | PIC slot number of the FPC for which the preemption list information is displayed. | **detail** |
| **Priority Level** | Priority of the call that was set up: 1 is the highest and 15 is the lowest. For each priority level, the following information is displayed:<br>• **GBR**—Number of GBR bearers for the corresponding priority level.<br>• **NON-GBR**—Number of GBR bearers for the corresponding priority level. | All levels |

## Sample Output

**show unified-edge ggsn-pgw status preemption-list brief**

```
user@host> show unified-edge ggsn-pgw status preemption-list brief
Gateway: PGW

                                    GBR          NON-GBR

    Priority Level 1     :       0             1
    Priority Level 2     :       0              11
    Priority Level 3     :       0              0
    Priority Level 4     :       0              0
    Priority Level 5     :       0              0
    Priority Level 6     :       0              0
    Priority Level 7     :       0              0
    Priority Level 8     :       0              0
    Priority Level 9     :       0              0
    Priority Level 10    :       0              0
    Priority Level 11    :       0              0
    Priority Level 12    :       0              0
    Priority Level 13    :       0              0
    Priority Level 14    :       0              0
    Priority Level 15    :       0              0
```

**show unified-edge ggsn-pgw status preemption-list detail**

```
user@host> show unified-edge ggsn-pgw status preemption-list detail
Gateway: PGW


    Preemption List status:

    FPC SLOT: 0   PIC SLOT: 0

                                    GBR          NON-GBR

    Priority Level 1     :       0              0
    Priority Level 2     :       0              6
```

```
    Priority Level 3     :       0             0
    Priority Level 4     :       0             0
    Priority Level 5     :       0             0
    Priority Level 6     :       0             0
    Priority Level 7     :       0             0
    Priority Level 8     :       0             0
    Priority Level 9     :       0             0
    Priority Level 10    :       0             0
    Priority Level 11    :       0             0
    Priority Level 12    :       0             0
    Priority Level 13    :       0             0
    Priority Level 14    :       0             0
    Priority Level 15    :       0             0


    Preemption List status:

    FPC SLOT: 0   PIC SLOT: 1

                                GBR         NON-GBR

    Priority Level 1     :       0            0
    Priority Level 2     :       0             0
    Priority Level 3     :       0             0
    Priority Level 4     :       0             0
    Priority Level 5     :       0             0
    Priority Level 6     :       0             0
    Priority Level 7     :       0             0
    Priority Level 8     :       0             0
    Priority Level 9     :       0             0
    Priority Level 10    :       0             0
    Priority Level 11    :       0             0
    Priority Level 12    :       0             0
    Priority Level 13    :       0             0
    Priority Level 14    :       0             0
    Priority Level 15    :       0             0

[...output truncated...]
```

## show unified-edge ggsn-pgw subscribers traffic-class

**Syntax** show unified-edge ggsn-pgw subscribers traffic-class (background | conversational | interactive | streaming)
<traffic-handling-priority *traffic-handling-priority*>

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the subscribers information for the specified traffic class one or more Gateway GPRS Support Nodes (GGSNs) or Packet Data Network Gateways (P-GWs).

**Options**

**traffic-class (background | conversational | interactive | streaming)**—Display the subscriber information for the specified traffic class.

**traffic-handling-priority *traffic-handling-priority***—(Optional) Display the subscriber information for the specified traffic handling priority. You can specify a traffic handling priority value of 1 through 3.

NOTE: **This field is applicable only if the traffic class is specified as interactive.**

**Required Privilege Level** view

**Related Documentation**

- show unified-edge ggsn-pgw subscribers on page 1177

**List of Sample Output**

show unified-edge ggsn-pgw subscribers traffic-class conversational on page 1269
show unified-edge ggsn-pgw subscribers traffic-class interactive traffic—handling-priority 1 on page 1270

**Output Fields** The output fields for the **show unified-edge ggsn-pgw subscribers traffic-class** command are a subset of the output fields for the **show unified-edge ggsn-pgw subscribers** command. Refer to the explanation of the output fields for the **show unified-edge ggsn-pgw subscribers** command.

### Sample Output

**show unified-edge ggsn-pgw subscribers traffic-class conversational**

```
user@host> show unified-edge ggsn-pgw subscribers traffic-class conversational
Gateway: PGW1

Subscriber Information:
  UE:
    IMSI: 734444553453197              IMEI: 1122334455677796
    RAT Type: UTRAN
  PDN Session:
    APN name: internet123
    IPv4 Address: 20.1.0.1             IPv6 Address: None
    GTP Version: 1                     Address Assignment: Local
    Local Control IP: 18.1.1.2         Remote Control IP: 30.1.1.2
```

```
  Local Control TEID: 0xb000000      Remote Control TEID: 0x5033
  Session PIC: 0 /0  (FPC/PIC)       PFE: 5 /0  (FPC/PIC)
  Service PIC: None/None (FPC/PIC)
  Session State: Established         Session Duration: 3:13
  Roaming Status: Visitor            Serving network: MCC: None MNC: None
  Direct Tunnel: Disabled
Bearer:
  NSAPI/EBI: 5
  Local Data IP: 18.1.1.2            Remote Data IP: 30.1.1.2
  Local Data TEID: 0x130000          Remote Data TEID: 0x5032
  Bearer State: Established
  Idle Timeout: 0   min              AAA Interim Interval: 0   min
  Negotiated QoS Parameters:
     Traffic Class:Conversational       ARP: 1
     Traffic Handling Priority:0        Transfer Delay: 80
     MBR Uplink: 8640             kbps  MBR Downlink: 8640      kbps
     GBR Uplink: 4672             kbps   GBR Downlink: 4672      kbps
                                         Signaling Indicator: 0
     Forwarding Class:  None         Loss Priority:  None
  Requested QoS Parameters:
     Traffic Class: Conversational      ARP: 1
     Traffic Handling Priority: 0       Transfer Delay: 10
     MBR Uplink  : 8640           kbps  MBR Downlink: 8640      kbps
     GBR Uplink  : 4672           kbps  GBR Downlink: 4672      kbps
                                         Signaling Indicator: 0
  Charging information:
     Charging ID: 0xb000000
     Profile ID: 0
  Rating group information:
     Rating group: 0 Service id: 0
```

### show unified-edge ggsn-pgw subscribers traffic-class interactive traffic–handling-priority 1

```
user@host> show unified-edge ggsn-pgw subscribers traffic-class interactive
traffic–handling-priority 1
Gateway: PGW1

Subscriber Information:
  UE:
    IMSI: 324213213134030              IMEI: 1122334455667790
    MSISDN: 1926737867                 Time Zone: GMT     DST: None
    RAT Type: E-UTRAN
    User Location Info:
      MCC:  None   MNC: 180
      LAC: 0x22 CI: 0x0     SAC: 0x2b RAC: 0x0  TAC: 0x4  ECI: 0x0
  PDN Session:
    APN name: internet123
    IPv4 Address: 20.1.0.1             IPv6 Address: None
    GTP Version: 2                     Address Assignment: Local
    Local Control IP: 18.1.1.2         Remote Control IP: 30.1.1.2
    Local Control TEID: 0x14000000     Remote Control TEID: 0x113
    Peer CSID: 0                       Remote CSID: 0
    Selection mode: MS or network provided APN, subscription verified
    Session PIC: 0 /0  (FPC/PIC)       PFE: 5 /0  (FPC/PIC)
    Service PIC: None/None (FPC/PIC)
    Session State: Established         Session Duration: 10
    Roaming Status: Visitor            Serving network: MCC: 123  MNC: 567
    Direct Tunnel: None
    Negotiated APN AMBR: Downlink: 128 kbps        Uplink: 128  kbps
    Requested  APN AMBR: Downlink: 128 kbps        Uplink: 128  kbps
  Bearer:
    NSAPI/EBI: 5
    Local Data IP: 18.1.1.2            Remote Data IP: 30.1.1.2
```

```
Local Data TEID: 0x14140000        Remote Data TEID: 0x114
Bearer State: Established          Substate: None
Idle Timeout: 0   min              AAA Interim Interval: 0   min
Negotiated QoS Parameters:
   QCI: 5                          ARP: 2 /0 /0   (PL/PVI/PCI)
   Forwarding Class:  None         Loss Priority:  None
Requested QoS Parameters:
   QCI: 5                          ARP: 2 /0 /0   (PL/PVI/PCI)
Charging information:
   Charging ID: 0x14000000
   Profile ID: 0
   State: Init                     Previous State: Init
   Profile selection criteria: None
Offline charging information: Disabled
Rating group information:
   Rating group: 0 Service id: 0
   Action ID: 0x0                      Trigger profile: 0
   Change condition bitmask: 0x0       Action-id-bitmask: 0x0
   Signal bitmask: 0x0                 Last signal bitmask: 0x0
   Last statistics info:
     Collection time: None collected
```

## show unified-edge sgw status preemption-list

**Syntax** **show unified-edge sgw status preemption-list**
<brief | detail>
<fpc-slot *fpc-slot*>
<gateway *gateway*>
<pic-slot *pic-slot*>

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the preemption list for guaranteed bit rate (GBR) and non-GBR bearers in the Serving Gateways (S-GWs). If a gateway name is not specified, then the preemption list for all S-GWs is displayed.

NOTE:

- In load conditions, to accommodate higher-priority bearers, lower-priority bearers are preempted. This list displays the number of bearers in each candidate priority level for preemption.
- This command displays a preemption list only if preemption is enabled on the S-GW.

**Options** **none**—(Same as brief) Display the preemption list information in brief.

**brief | detail** —(Optional) Display the specified level of output.

**fpc-slot *fpc-slot***—(Optional) Display the preemption list information for the specified Flexible PIC Concentrator (FPC) slot number. You must specify a PIC slot number along with an FPC slot number.

**gateway *gateway***—(Optional) Display the preemption list for the specified gateway.

**pic-slot *pic-slot***—(Optional) Display the status information for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge sgw status on page 1413

**List of Sample Output**
show unified-edge ggsn-pgw status preemption-list brief on page 1273
show unified-edge ggsn-pgw status preemption-list detail on page 1273

**Output Fields** Table 107 on page 1273 lists the output fields for the **show unified-edge sgw status preemption-list** command. Output fields are listed in the approximate order in which they appear.

Table 107: show unified-edge sgw status preemption-list Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the S-GW. | All levels |
| **FPC Slot** | FPC slot number of the interface for which the preemption list information is displayed. | **detail** |
| **PIC Slot** | PIC slot number of the FPC for which the preemption list information is displayed. | **detail** |
| **Priority Level** | Priority of the call that was set up: 1 is the highest and 15 is the lowest. For each priority level, the following information is displayed:<br>• **GBR**—Number of GBR bearers for the corresponding priority level.<br>• **NON-GBR**—Number of GBR bearers for the corresponding priority level. | All levels |

## Sample Output

**show unified-edge ggsn-pgw status preemption-list brief**

```
user@host> show unified-edge ggsn-pgw status preemption-list brief
Gateway: SGW

                                GBR          NON-GBR

    Priority Level 1     :       0            0
    Priority Level 2     :       0            0
    Priority Level 3     :       0            0
    Priority Level 4     :       0            0
    Priority Level 5     :       1034         0
    Priority Level 6     :       0            1000
    Priority Level 7     :       0            0
    Priority Level 8     :       0            0
    Priority Level 9     :       1000         0
    Priority Level 10    :       0            1060
    Priority Level 11    :       0            0
    Priority Level 12    :       0            0
    Priority Level 13    :       0            0
    Priority Level 14    :       0            0
    Priority Level 15    :       0            0
```

**show unified-edge ggsn-pgw status preemption-list detail**

```
user@host> show unified-edge ggsn-pgw status preemption-list detail
Gateway: SGW

    Preemption List status:

    FPC SLOT: 3   PIC SLOT: 0

                                GBR          NON-GBR

    Priority Level 1     :       0            0
    Priority Level 2     :       0            0
    Priority Level 3     :       0            0
    Priority Level 4     :       0            0
    Priority Level 5     :       1034         0
    Priority Level 6     :       0            1000
```

```
Priority Level 7     :       0            0
Priority Level 8     :       0            0
Priority Level 9     :       1000         0
Priority Level 10    :       0            1060
Priority Level 11    :       0            0
Priority Level 12    :       0            0
Priority Level 13    :       0            0
Priority Level 14    :       0            0
Priority Level 15    :       0            0
```

CHAPTER 34

# Exception Handling Operational Commands

## clear services inline ip-reassembly statistics

**Syntax** clear services inline ip-reassembly statistics
<fpc *fpc-slot*>
<pfe *pfe-slot*>

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Clear the inline IP reassembly statistics for the Packet Forwarding Engines one or more Trio-based FPCs.

If this command is executed when traffic is flowing, then the inline IP reassembly statistics are cleared up to the instant of running the command. If traffic is stopped, then all inline IP reassembly statistics are cleared.

NOTE: Inline IP reassembly can only be carried out on Trio-based FPCs.

**Options** **none**—Clear the inline IP reassembly statistics for one or more FPCs.

**fpc *fpc-slot***—(Optional) Clear the inline IP reassembly statistics for all Packet Forwarding Engines on the specified FPC.

**pfe *pfe-slot***—(Optional) Clear the inline IP reassembly statistics for the specified Packet Forwarding Engine slot. You must specify an FPC slot number before specifying a Packet Forwarding Engine slot.

**Required Privilege Level** clear

**Related Documentation**
- show services inline ip-reassembly statistics on page 1279

**List of Sample Output** clear services inline ip-reassembly statistics on page 1276

**Output Fields** When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**clear services inline ip-reassembly statistics**

```
user@host> clear services inline ip-reassembly statistics
Cleared inline ip-reassembly statistics
```

## clear unified-edge ggsn-pgw ip-reassembly statistics

**Syntax** **clear unified-edge ggsn-pgw ip-reassembly statistics**
<fpc-slot *fpc-slot*>
<gateway *gateway*>
<*inet*>
<pic-slot *pic-slot*>

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
**gateway** option introduced in Junos OS Mobility Release 11.4W.

**Description** Clear the IP reassembly statistics for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then statistics for all GGSNs and P-GWs are cleared.

**Options**

**none**—Clear the IP reassembly statistics for all GGSNs and P-GWs.

**fpc-slot *fpc-slot* pic-slot *pic-slot***—(Optional) Clear the IP reassembly statistics for the specified Flexible PIC Concentrator (FPC) and PIC slot numbers.

**gateway**—(Optional) Clear the IP reassembly statistics for all the services PICs in the specified GGSN or P-GW.

**inet**—(Optional) Clear the IP reassembly for IPv4 packets.

**Required Privilege Level** clear, unified-edge

**Related Documentation**
- show unified-edge ggsn-pgw ip-reassembly statistics on page 1283

**List of Sample Output** clear unified-edge ggsn-pgw ip-reassembly statistics on page 1277

**Output Fields** When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**clear unified-edge ggsn-pgw ip-reassembly statistics**

```
user@host>  clear unified-edge ggsn-pgw ip-reassembly statistics
 Cleared IP re-assembly statistics
```

## clear unified-edge sgw ip-reassembly statistics

**Syntax**
**clear unified-edge sgw ip-reassembly statistics**
**<fpc-slot** ***fpc-slot*****>**
**<gateway** ***gateway*****>**
**<inet>**
**<pic-slot** ***pic-slot*****>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Clear the IP reassembly statistics for one or more Serving Gateways (S-GWs). If a gateway name is not specified, then statistics for all S-GWs are cleared.

**Options**
**none**—Clear the IP reassembly statistics for all S-GWs.

**fpc-slot** ***fpc-slot*** **pic-slot** ***pic-slot***—(Optional) Clear the IP reassembly statistics for the specified Flexible PIC Concentrator (FPC) and PIC slot numbers.

**gateway**—(Optional) Clear the IP reassembly statistics for all the services PICs in the specified gateway.

***inet***—(Optional) Clear the IP reassembly statistics for IPv4 packets.

**Required Privilege Level** clear, unified-edge

**Related Documentation**
- show unified-edge sgw ip-reassembly statistics on page 1286

**List of Sample Output** clear unified-edge sgw ip-reassembly statistics on page 1278

**Output Fields** When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**clear unified-edge sgw ip-reassembly statistics**

```
user@host> clear unified-edge sgw ip-reassembly statistics
 Cleared IP re-assembly statistics
```

## show services inline ip-reassembly statistics

**Syntax** show services inline ip-reassembly statistics
<fpc *fpc-slot*>
<pfe *pfe-slot*>

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the inline IP reassembly statistics for the Packet Forwarding Engines on one or more Trio-based FPCs. Inline IP reassembly statistics are collected at the Packet Forwarding Engine level.

NOTE: Inline IP reassembly can only be carried out on Trio-based FPCs.

**Options** **none**—Display the inline IP reassembly statistics for one or more FPCs.

**fpc *fpc-slot***—(Optional) Display the inline IP reassembly statistics for the specified FPC.

**pfe *pfe-slot***—(Optional) Display the inline IP reassembly statistics for the specified Packet Forwarding Engine slot. You must specify an FPC slot number before specifying a Packet Forwarding Engine slot.

**Required Privilege Level** view

**Related Documentation**
- clear services inline ip-reassembly statistics on page 1276

**List of Sample Output** show services inline ip-reassembly statistics fpc <fpc-slot> on page 1281

**Output Fields** Table 108 on page 1279 lists the output fields for the **show services inline ip-reassembly statistics** command. Output fields are listed in the approximate order in which they appear.

### Table 108: show services inline ip-reassembly statistics Output Fields

| Field Name | Field Description |
|---|---|
| **FPC** | FPC slot number for which the statistics are displayed. |
| **PFE** | Packet Forwarding Engine on the FPC for which the statistics are displayed. |

Table 108: show services inline ip-reassembly statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Total Fragments Received** | Total number of fragments received and the current rate of fragments received for inline IP reassembly. The following information is also displayed:<br>• **First Fragments**—Number of first fragments received and current rate of first fragments processed.<br>• **Intermediate Fragments**—Number of intermediate fragments received and current rate of intermediate fragments processed.<br>• **Last Fragments**—Number and rate of last fragments received.<br>NOTE: Rate refers to the current number of fragments processed per second in the instant preceding the command's execution. |
| **Total Packets Reassembled** | Total number of packets reassembled and current rate, in the instant preceding the command's execution, at which the packets are reassembled. |
| **Approximate Packets Pending Reassembly** | Approximate number of packets pending reassembly. |
| **Fragments Dropped Reasons** | Total number of fragments dropped reasons and the current rate of total fragment dropped reasons. The number of dropped reasons and rate corresponding to each of the following reasons are also displayed:<br>• Buffers not available<br>• Fragments per packet exceeded<br>• Packet length exceeded<br>• Record insert error<br>• Record in use error<br>• Duplicate first fragments<br>• Duplicate last fragments<br>• Missing first fragment<br>NOTE:<br>• The fragment dropped reasons indicate the why a fragment was dropped. When a fragment is dropped, the corresponding reason field (under the **Fragment Dropped Reasons** field) indicating why it was dropped is incremented by 1. For example, when a fragment is dropped because the memory runs out, then the **Buffers not available** field is incremented by 1.<br>• Rate refers to the current number of fragment dropped reasons per second in the instant preceding the command's execution. |
| **Reassembly Errors Reasons** | Number of errors during reassembly and the current rate of reassembly errors. The number of errors and the rate for each of the following types of errors are also displayed:<br>• Fragment not found<br>• Fragment not in sequence<br>• ASIC errors<br>NOTE: Rate refers to the current number of reassembly errors processed per second in the instant preceding the command's execution. |
| **Aged out packets** | Number of aged out packets and the current number of packets aged out per second in the instant preceding the command's execution. |

Table 108: show services inline ip-reassembly statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Total Fragments Successfully Reassembled** | Number of fragments successfully reassembled and the current number of fragments reassembled per second in the instant preceding the command's execution. |
| **Total Fragments Dropped** | Total number of fragments dropped and the current rate of total number of fragments dropped. The number of fragments dropped and rate corresponding to each of the following reasons are also displayed:<br>• Buffers not available<br>• Fragments per packet exceeded<br>• Packet length exceeded<br>• Record insert error<br>• Record in use error<br>• Duplicate first fragments<br>• Duplicate last fragments<br>• Missing first fragment<br>• Fragment not found<br>• Fragment not in sequence<br>• ASIC errors<br>• Aged out fragments<br>NOTE:<br>• The total fragments dropped indicates how many of the packet fragments received were then dropped due to a particular reason. For example, consider a packet that has ten fragments, nine of which have been received and stored in memory. When the tenth fragment arrives, if the memory runs out (Buffers not available), then this fragment is dropped. Since the tenth fragment has been dropped, the other nine fragments also have to be dropped. In this case, the **Buffers not available** field (under the **Fragments Dropped Reasons** field) would be incremented by 1 and the **Buffers not available** field (under the **Total Fragments Dropped** field) would be incremented by 10.<br>• Rate refers to the current total number fragments dropped per second in the instant preceding the command's execution. |
| **Punt to UPIC** | Number of fragments sent to the backup user plane PIC (services PIC) and current rate of fragments sent per second in the instant preceding the command's execution |

## Sample Output

**show services inline ip-reassembly statistics fpc <fpc-slot>**

```
user@host> show services inline ip-reassembly statistics fpc 2
FPC: 2 PFE: 2
==============
                                                Total   Current Rate
Total Fragments Received                    432142720       6190683
   First Fragments                          216069011       3095332
   Intermediate Fragments                           0             0
   Last Fragments                           216073709       3095351

Total Packets Reassembled                    19695813        436470

Total Packets Pending Reassembly                 2755
```

| | | |
|---|---|---|
| Fragments Dropped Reasons | 145655 | 9946 |
| Buffers not available | 0 | 0 |
| Fragments per packet exceeded | 0 | 0 |
| Packet length exceeded | 0 | 0 |
| Record insert error | 0 | 0 |
| Record in use error | 145655 | 9946 |
| Duplicate first fragments | 0 | 0 |
| Duplicate last fragments | 0 | 0 |
| Missing first fragment | 0 | 0 |
| Reassembly Errors Reasons | 0 | 0 |
| Fragment not found | 0 | 0 |
| Fragment not in sequence | 0 | 0 |
| ASIC errors | 0 | 0 |
| Aged out packets | 1703485 | 37739 |
| Total Fragments Successfully Reassembled | 39391626 | 872940 |
| Total Fragments Dropped | 1849140 | 47685 |
| Buffers not available | 0 | 0 |
| Fragments per packet exceeded | 0 | 0 |
| Packet length exceeded | 0 | 0 |
| Record insert error | 0 | 0 |
| Record in use error | 145655 | 9946 |
| Duplicate first fragments | 0 | 0 |
| Duplicate last fragments | 0 | 0 |
| Missing first fragment | 0 | 0 |
| Fragment not found | 0 | 0 |
| Fragment not in sequence | 0 | 0 |
| ASIC errors | 0 | 0 |
| Aged out fragments | 1703485 | 37739 |
| Total fragments punted to UPIC | 357272140 | 5270086 |

## show unified-edge ggsn-pgw ip-reassembly statistics

**Syntax** **show unified-edge ggsn-pgw ip-reassembly statistics**
<**brief | detail**>
<**fpc-slot** *fpc-slot*>
<**gateway** *gateway*>
<**inet**>
<**pic-slot** *pic-slot*>

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
**gateway** option introduced in Junos OS Mobility Release 11.4W.

**Description** Display the IP reassembly statistics for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then statistics for all GGSNs and P-GWs are displayed.

**Options** **none**—(Same as brief) Display the IP reassembly statistics for all GGSNs and P-GWs.

**brief | detail**—(Optional) Display the specified level of output.

NOTE: The **brief** option displays the aggregated statistics from all the services PICs for each GGSN or P-GW. The **detail** option displays the statistics for each services PIC separately for each GGSN or P-GW.

**fpc-slot** ***fpc-slot*** **pic-slot** ***pic-slot***—(Optional) Display the IP reassembly statistics for the specified Flexible PIC Concentrator (FPC) and PIC slot numbers.

**gateway**—(Optional) Display the IP reassembly statistics for the specified GGSN or P-GW.

***inet***—(Optional) Display the IP reassembly for IPv4 packets.

**Required Privilege Level** view

**Related Documentation**
- clear unified-edge ggsn-pgw ip-reassembly statistics on page 1277

**List of Sample Output**
show unified-edge ggsn-pgw ip-reassembly statistics brief on page 1285
show unified-edge ggsn-pgw ip-reassembly statistics detail on page 1285

**Output Fields** Table 109 on page 1283 lists the output fields for the **show unified-edge ggsn-pgw ip-reassembly statistics** command. Output fields are listed in the approximate order in which they appear.

### Table 109: show unified-edge ggsn-pgw ip-reassembly statistics Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the GGSN or P-GW. | All levels |

Table 109: show unified-edge ggsn-pgw ip-reassembly statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| IP Reassembly Statistics | | |
| **FPC Slot** | FPC slot number for which the statistics are displayed. | **detail** |
| **PIC slot** | PIC slot number for which the statistics are displayed. | **detail** |
| **First fragments** | Number of first fragments. | All levels |
| **Non-first fragments** | Number of non-first fragments. | All levels |
| **Total fragments** | Total number of fragments. | All levels |
| **Reassembled packets** | Total number of reassembled packets. In this case, all fragments of the packets have been received. | All levels |
| **Merged packets** | Total number of merged packets. In this case, all the fragments of a packet have been merged into a single packet. | All levels |
| **Packets pending reassembly** | Total number of packets pending reassembly. | All levels |
| **Timed out packets** | Total number of fragmented packets that exceeded the reassembly timeout. | All levels |
| **Timed out fragments** | Total number of fragments that exceeded the reassembly timeout. | All levels |
| **Exceeded maximum packet length** | Number of packets dropped because the defragmented packets exceeded the maximum packet size. | All levels |
| Fragments Dropped | | |
| **Invalid Length** | Number of fragments of invalid length received. | All levels |
| **Overlap** | Number of overlapping fragments received. | All levels |
| **Duplicate** | Number of duplicate fragments received. | All levels |
| **No buffers** | Number of fragments dropped because the system ran out of the packet buffer. | All levels |
| **Packet limit exceeded** | Total number of fragments dropped because the maximum allowed number of fragments was exceeded. | All levels |
| **Total fragments dropped** | Total number of fragments dropped. | All levels |

## Sample Output

**show unified-edge ggsn-pgw ip-reassembly statistics brief**

```
user@host> show unified-edge ggsn-pgw ip-reassembly statistics brief
Gateway: gw1
IP reassembly statistics:
  First fragments:               1
  Non-first fragments:           1
  Total fragments:               2
  Reassembled packets:           1
  Merged packets:                1
  Packets pending reassembly:    0
  Timed out packets:             0
  Timed out fragments:           0
  Exceeded maximum packet length:0
Fragments Dropped:
  Invalid length:                0
  Overlap:                       0
  Duplicate:                     0
  No buffers:                    0
  Packet limit exceeded:         0
  Total fragments dropped:       0
```

**show unified-edge ggsn-pgw ip-reassembly statistics detail**

```
user@host> show unified-edge ggsn-pgw ip-reassembly statistics detail
Gateway: gw1
IP reassembly statistics (FPC 5 PIC 0):
  First fragments:               1
  Non-first fragments:           1
  Total fragments:               2
  Reassembled packets:           1
  Merged packets:                1
  Packets pending reassembly:    0
  Timed out packets:             0
  Timed out fragments:           0
  Exceeded maximum packet length:0
Fragments Dropped:
  Invalid length :               0
  Overlap :                      0
  Duplicate :                    0
  No buffers:                    0
  Packet limit exceeded:         0
  Total fragments dropped:       0
```

## show unified-edge sgw ip-reassembly statistics

**Syntax** **show unified-edge sgw ip-reassembly statistics**
**<brief | detail>**
**<fpc-slot *fpc-slot*>**
**<gateway *gateway*>**
**<inet>**
**<pic-slot *pic-slot*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the IP reassembly statistics for the one or more Serving Gateways (S-GWs). If a gateway name is not specified, then statistics for all S-GWs are displayed.

**Options** **none**—(Same as brief) Display the IP reassembly statistics in brief for all S-GWs.

**brief | detail**—(Optional) Display the specified level of output.

NOTE: The **brief** option displays the aggregated statistics from all the services PICs for each S-GW. The **detail** option displays the statistics for each services PIC separately for each S-GW.

**fpc-slot *fpc-slot* pic-slot *pic-slot***—(Optional) Display the IP reassembly statistics for the specified Flexible PIC Concentrator (FPC) and PIC slot numbers.

**gateway**—(Optional) Display the IP reassembly statistics for the specified gateway.

***inet***—(Optional) Display the IP reassembly statistics for IPv4 packets.

**Required Privilege Level** view

**Related Documentation**
- clear unified-edge sgw ip-reassembly statistics on page 1278

**List of Sample Output**
show unified-edge sgw ip-reassembly statistics brief on page 1288
show unified-edge sgw ip-reassembly statistics detail on page 1288

**Output Fields** Table 110 on page 1286 lists the output fields for the **show unified-edge sgw ip-reassembly statistics** command. Output fields are listed in the approximate order in which they appear.

Table 110: show unified-edge sgw ip-reassembly statistics Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| Gateway | Name of the S-GW. | All levels |
| IP Reassembly Statistics | | |

Table 110: show unified-edge sgw ip-reassembly statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| Gateway | Name of the S-GW. | All levels |
| **FPC Slot** | FPC slot number for which the statistics are displayed. | **detail** |
| **PIC slot** | PIC slot number for which the statistics are displayed. | **detail** |
| **First fragments** | Number of first fragments. | All levels |
| **Non-first fragments** | Number of non-first fragments. | All levels |
| **Total fragments** | Total number of fragments. | All levels |
| **Reassembled packets** | Total number of reassembled packets. In this case, all fragments of the packets have been received. | All levels |
| **Merged packets** | Total number of merged packets. In this case, all the fragments of a packet have been merged into a single packet. | All levels |
| **Packets pending reassembly** | Total number of packets pending reassembly. | All levels |
| **Timed out packets** | Total number of fragmented packets that exceeded the reassembly timeout. | All levels |
| **Timed out fragments** | Total number of fragments that exceeded the reassembly timeout. | All levels |
| **Exceeded maximum packet length** | Number of packets dropped because the defragmented packets exceeded the maximum packet size. | All levels |
| Fragments Dropped | | |
| **Invalid Length** | Number of fragments of invalid length received. | All levels |
| **Overlap** | Number of overlapping fragments received. | All levels |
| **Duplicate** | Number of duplicate fragments received. | All levels |
| **No buffers** | Number of fragments dropped because the system ran out of the packet buffer. | All levels |
| **Packet limit exceeded** | Total number of fragments dropped because the maximum allowed number of fragments was exceeded. | All levels |
| **Total fragments dropped** | Total number of fragments dropped. | All levels |

## Sample Output

**show unified-edge sgw ip-reassembly statistics brief**

```
user@host> show unified-edge sgw ip-reassembly statistics brief
Gateway: sgw1
IP reassembly statistics:
  First fragments:               1
  Non-first fragments:           2
  Total fragments:               3
  Reassembled packets:           1
  Merged packets:                1
  Packets pending reassembly:    0
  Timed out packets:             0
  Timed out fragments:           0
  Exceeded maximum packet length:0
Fragments Dropped:
  Invalid length:                0
  Overlap:                       0
  Duplicate:                     0
  No buffers:                    0
  Packet limit exceeded:         0
  Total fragments dropped:       0
```

**show unified-edge sgw ip-reassembly statistics detail**

```
user@host> show unified-edge sgw ip-reassembly statistics detail
Gateway: sgw1
IP reassembly statistics (FPC 5 PIC 1):
  First fragments:               1
  Non-first fragments:           2
  Total fragments:               3
  Reassembled packets:           1
  Merged packets:                1
  Packets pending reassembly:    0
  Timed out packets:             0
  Timed out fragments:           0
  Exceeded maximum packet length:0
Fragments Dropped:
  Invalid length :               0
  Overlap :                      0
  Duplicate :                    0
  No buffers:                    0
  Packet limit exceeded:         0
  Total fragments dropped:       0
```

CHAPTER 35

# GPRS Tunneling Protocol (GTP) Operational Commands

## clear unified-edge ggsn-pgw gtp peer statistics

**Syntax**

clear unified-edge ggsn-pgw gtp peer statistics gateway *gateway* remote-address *remote-address*
<fpc-slot *fpc-slot*>
<gtp-all>
<gtp-v0>
<gtp-v1>
<gtp-v2>
<local-address *local-address*>
<pic-slot *pic-slot*>
<routing-instance *routing-instance*>

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W.

**Description**

Clear the statistics for the GTP peer on the specified gateway GPRS support node (GGSN) or a Packet Data Network Gateway (P-GW).

**Options**

gateway *gateway*—Clear the statistics for the specified gateway.

remote-address *remote-address*—Clear the statistics for the peer with the specified remote address.

fpc-slot *fpc-slot*—(Optional) Clear the statistics for the peer on the specified FPC slot.

gtp-all—(Optional) Clear the statistics for GTP versions 0, 1, and 2.

gtp-v0—(Optional) Clear the GTP version 0 statistics.

gtp-v1—(Optional) Clear the GTP version 1 statistics.

gtp-v2—(Optional) Clear the GTP version 2 statistics.

local-address *local-address*—(Optional) Clear the statistics for the peer with the specified local IP address.

pic-slot *slot*—(Optional) Clear the statistics for the peer on the specified PIC slot. You must specify an FPC slot number before specifying a PIC slot number.

routing-instance *routing-instance*—(Optional) Clear the statistics for the peer on the specified routing instance.

**Required Privilege Level**

clear, unified-edge

**Related Documentation**

- show unified-edge ggsn-pgw gtp peer statistics on page 1301

**List of Sample Output**

clear unified-edge ggsn-pgw gtp peer statistics gateway PGW remote-address 122.2.2.2 on page 1291

**Output Fields**

When you enter this command, you are provided feedback on the status of your request.

## Sample Output

**clear unified-edge ggsn-pgw gtp peer statistics gateway PGW remote-address 122.2.2.2**

```
user@host> clear unified-edge ggsn-pgw gtp peer statistics gateway PGW remote-address
122.2.2.2
Cleared GTP peer statistics
```

## clear unified-edge ggsn-pgw gtp statistics

**Syntax** **clear unified-edge ggsn-pgw gtp statistics gateway *gateway***
**<fpc-slot *fpc-slot*>**
**<pic-slot *pic-slot*>**

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.

**Description** Clear the global GTP statistics for the specified gateway GPRS support node (GGSN) or a Packet Data Network Gateway (P-GW).

**Options** **gateway *gateway***—Clear the statistics for the specified gateway.

**fpc-slot *fpc-slot***—(Optional) Clear the statistics for the specified FPC slot.

**pic-slot *slot***—(Optional) Clear the statistics for the peer on the specified PIC slot. You must specify an FPC slot number before specifying a PIC slot number.

**Required Privilege Level** clear, unified-edge

**Related Documentation**
- show unified-edge ggsn-pgw gtp statistics on page 1309

**List of Sample Output** clear unified-edge ggsn-pgw gtp statistics gateway PGW on page 1292

**Output Fields** No message is displayed on successful execution of this command; otherwise an error message is displayed.

### Sample Output

**clear unified-edge ggsn-pgw gtp statistics gateway PGW**

```
user@host> clear unified-edge ggsn-pgw gtp statistics gateway PGW
```

## clear unified-edge sgw gtp peer statistics

**Syntax**

clear unified-edge sgw gtp peer statistics remote-address *remote-address*
<fpc-slot *fpc-slot*>
<gateway *gateway*>
<local-address *local-address*>
<pic-slot *pic-slot*>
<routing-instance *routing-instance*>

**Release Information**

Command introduced in Junos OS Mobility Release 11.4W.

**Description**

Clear the statistics for the specified GPRS tunneling protocol (GTP) peer on one or more Serving Gateways (S-GWs). If an S-GW is not specified, then the statistics are cleared for the specified peer on all the S-GWs.

**Options**

remote-address *remote-address*—Clear the statistics for the GTP peer with the specified remote address.

fpc-slot *fpc-slot*—(Optional) Clear the statistics for the specified Flexible PIC Concentrator (FPC) slot number.

gateway *gateway*—(Optional) Clear the statistics for peer on the specified S-GW.

local-address *local-address*—(Optional) Clear the statistics for the peer with the specified local IP address.

pic-slot *pic-slot*—(Optional) Clear the statistics for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

routing-instance *routing-instance*—(Optional) Clear the statistics for the peer on the specified routing instance.

**Required Privilege Level**

clear, unified-edge

**Related Documentation**

- show unified-edge sgw gtp peer statistics on page 1325

**List of Sample Output**

clear unified-edge sgw gtp peer statistics remote-address 122.2.2.2 on page 1293

**Output Fields**

When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**clear unified-edge sgw gtp peer statistics remote-address 122.2.2.2**

```
user@host> clear unified-edge sgw gtp peer statistics remote-address 122.2.2.2
Cleared GTP Peer statistics
```

## clear unified-edge sgw gtp statistics

**Syntax** **clear unified-edge sgw gtp statistics gateway *gateway***
**<fpc-slot *fpc-slot*>**
**<pic-slot *pic-slot*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Clear the global GPRS tunneling protocol (GTP) statistics for the specified Serving Gateway (S-GW).

**Options** **gateway *gateway***—Clear the GTP statistics for the specified S-GW.

**fpc-slot *fpc-slot***—(Optional) Clear the GTP statistics for the specified Flexible PIC Concentrator (FPC) slot number.

**pic-slot *pic-slot***—(Optional) Clear the GTP statistics for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**Required Privilege Level** clear, unified-edge

**Related Documentation**
- show unified-edge sgw gtp statistics on page 1330

**List of Sample Output** clear unified-edge sgw gtp statistics gateway SGW on page 1294

**Output Fields** No message is displayed on successful execution of this command; otherwise an error message is displayed.

### Sample Output

**clear unified-edge sgw gtp statistics gateway SGW**

```
user@host> clear unified-edge sgw gtp statistics gateway SGW
```

## show unified-edge ggsn-pgw gtp peer

**Syntax** **show unified-edge ggsn-pgw gtp peer**
<**detail**>
<**fpc-slot** *fpc-slot*>
<**gateway** *gateway*>
<**gn**>
<**gp**>
<**history**>
<**local-address** *local-address*>
<**pic-slot** *pic-slot*>
<**remote-address** *remote-address*>
<**routing-instance** *name*>
<**s5**>
<**s8**>

**Release Information** Statement introduced in Junos OS Mobility Release 11.2W.
**gn**, **gp**, **s5**, and **s8** attributes introduced in Junos OS Mobility Release 11.4W.

**Description** Display the information about GTP peers for one or more Gateway GPRS Support Nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then the information for all GGSNs and P-GWs is displayed.

**Options** **none**—Display the GTP peer information in brief.

**detail**—(Optional) Display detailed information about GTP peers.

**fpc-slot** *fpc-slot*—(Optional) Display the GTP peer information for the specified FPC slot number.

**gateway** *gateway-name*—(Optional) Display the GTP peer information for the specified gateway.

**gn**—Display the information about GTP peers on the gn interface.

**gp**—Display the information about GTP peers on the gp interface.

**history**—(Optional) Display the GTP peer information for peers that are no longer present on the gateway.

**local-address** *local-address*—(Optional) Display the GTP peer information for the local address of the specified peer on the gateway.

**pic-slot** *pic-slot*—(Optional) Display the GTP peer for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**remote-address** *remote-address*—(Optional) Display the GTP peer information for the peer with the specified remote address.

**routing-instance** *routing-instance*—(Optional) Display the GTP peer information for the peer on the specified routing instance name.

NOTE: If you specify the routing instance, you must also specify the remote address of the peer.

**s5**—Display the information about GTP peers on the s5 interface.

**s8**—Display the information about GTP peers on the s8 interface.

**Required Privilege Level** view

**Related Documentation**
- clear unified-edge ggsn-pgw gtp peer statistics on page 1290
- show unified-edge ggsn-pgw gtp peer count on page 1300
- show unified-edge ggsn-pgw gtp peer statistics on page 1301

**List of Sample Output**
show unified-edge ggsn-pgw gtp peer on page 1298
show unified-edge ggsn-pgw gtp peer detail on page 1298

**Output Fields** Table 111 on page 1296 lists the output fields for the **show unified-edge ggsn-pgw gtp peer** command. Output fields are listed in the approximate order in which they appear.

Table 111: show unified-edge ggsn-pgw gtp peer Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the GGSN or P-GW. | All levels |
| **Remote IP Address** | Remote IP address of the GTP peer. | All levels |
| **Local IP Address** | Local IP address of the GTP peer on the gateway. | All levels |
| **Routing Instance** | Name of the routing instance on which the GTP peer is located. | All levels |
| **Interface Type** | Type of 3GPP interface; for example S5, S8, and so on. | **detail** |
| **GTP Version** | GTP version number. | **detail** |
| **RCM Registration Done** | This parameter is used internally by the gateway. | **detail** |
| **Restart Counter Valid** | Indicates whether the restart counter of the peer is valid or not. | **detail** |
| **Restart Counter Value** | Current restart count of the peer. | **detail** |
| **Sent Restart Counter Value** | Restart counter value of the gateway that was sent to the peer. | **detail** |
| **Control Path N3 Request** | Maximum number of times that the S-GW attempts to send a signaling request message to a control peer. | **detail** |

Table 111: show unified-edge ggsn-pgw gtp peer Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Control Path T3 Timer** | Response timeout for GTP signaling request messages to a control peer. | **detail** |
| **Control Path Echo N3 Request** | Maximum number of retries of GTP echo request messages (for path management) to a control peer. | **detail** |
| **Control Path Echo T3 Timer** | Response timeout for GTP echo request messages (for path management) to a control peer. | **detail** |
| **Control Path Echo Interval** | Number of seconds that the GGSN or P-GW waits before sending an echo request message (for path management) to its control peer. | **detail** |
| **Control Path Management Enabled** | Indicates whether path management is enabled or not for the control plane. | **detail** |
| **Control Path State** | Path state of the GTP control plane:<br>• **Up**—Indicates that echo requests are being transmitted and responses are being received, which means that the peer is alive.<br>• **Down**—Indicates that echo requests are being transmitted but responses are not being received, which means that the peer is detected to be dead.<br>• **Not tracked**—Indicates that path management is disabled, which means that echo requests are not sent to the peer. | **detail** |
| **Control Min Response Time in usec** | Minimum response time, in microseconds, for GTP-C messages. | **detail** |
| **Control Max Response Time in usec** | Maximum response time, in microseconds, for GTP-C messages. | **detail** |
| **Control Avg Response Time in usec** | Average response time, in microseconds, for GTP-C messages. | **detail** |
| **Data Path Echo N3 Request** | Maximum number of retries of GTP echo request messages (for path management) to a data peer. | **detail** |
| **Data Path Echo T3 Timer** | Response timeout for GTP echo request messages (for path management) to a data peer. | **detail** |
| **Data Path Echo Interval** | Number of seconds that the GGSN or P-GW waits before sending an echo request message (for path management) to its data peer. | **detail** |
| **Data Path Management Enabled** | Indicates whether path management is enabled or not for the data plane. | **detail** |

Table 111: show unified-edge ggsn-pgw gtp peer Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Data Path State** | Path state of the GTP user plane:<br>• **Up**—Indicates that echo requests are being transmitted and responses are being received, which means that the peer is alive.<br>• **Down**—Indicates that echo requests are being transmitted but responses are not being received, which means that the peer is detected to be dead.<br>• **Not tracked**—Indicates that path management is disabled, which means that echo requests are not sent to the peer. | **detail** |
| **GTP-C using Short Sequence Number** | Indicates whether the peer is using the 16-bit sequence number length. | **detail** |
| **Downlink Data Notification Delay Interval** | This field is not relevant for the GGSN or P-GW. | **detail** |
| **CSID Supported** | Indicates whether the connection set identifier (CSID) is supported by the peer or not. | **detail** |

## Sample Output

**show unified-edge ggsn-pgw gtp peer**

```
user@host> show unified-edge ggsn-pgw gtp peer
Gateway: PGW
Remote IP Address       Local IP Address       Routing Instance
------------------------------------------------------------------
17.1.1.1                      17.1.1.2             default
```

**show unified-edge ggsn-pgw gtp peer detail**

```
user@host> show unified-edge ggsn-pgw gtp peer detail
Gateway: PGW
Peer Detail:
---------------
Remote IP Address                          : 17.1.1.1
Local IP Address                           : 17.1.1.2
Routing Instance                           : default
Interface Type                             : S5
GTP Version                                : 2
RCM Registration Done                      : yes
Restart Counter Valid                      : yes
Restart Counter Value                      : 65
Sent Restart Counter Value                 : 65
Control Path N3 Request                    : 3
Control Path T3 Timer                      : 5
Control Path Echo N3 Request               : 8
Control Path Echo T3 Timer                 : 15
Control Path Echo Interval                 : 60
Control Path Management Enabled            : yes
Control Path State                         : up
Control Min Response Time in usec          : 0
Control Max Response Time in usec          : 0
Control Avg Response Time in usec          : 0
Data Path Echo N3 Request                  : 8
```

```
Data Path Echo T3 Timer                     : 15
Data Path Echo Interval                     : 60
Data Path Management Enabled                : no
Data Path State                             : not-tracked
GTP-C using Short Sequence Number           : no
Downlink Data Notification Delay Interval   : 0
CSID Supported                              : yes
```

## show unified-edge ggsn-pgw gtp peer count

**Syntax** **show unified-edge ggsn-pgw gtp peer count**

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Display the number of GTP peers on each interface and the total number of GTP peers for one or more Gateway GPRS Support Nodes (GGSNs) or Packet Data Network Gateways (P-GWs).

**Options** This command has no options.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge ggsn-pgw gtp peer on page 1295

**List of Sample Output** show unified-edge ggsn-pgw gtp peer count on page 1300

**Output Fields** Table 112 on page 1300 lists the output fields for the **show unified-edge ggsn-pgw gtp peer count** command. Output fields are listed in the approximate order in which they appear.

Table 112: show unified-edge ggsn-pgw gtp peer Output Fields

| Field Name | Field Description |
|---|---|
| Interface Name | Name of the interface (Gn, Gp, S5, S8, and All) for which the GTP peer count is displayed. |
| Peer Count | The number of peers corresponding to the interface name (Gn, Gp, S5, S8, and All) is displayed. |

### Sample Output

**show unified-edge ggsn-pgw gtp peer count**

```
user@host> show unified-edge ggsn-pgw gtp peer count
Gateway: PGW
Interface Name           Peer Count
-----------------------------------
Gn Interface                      0
Gp Interface                      0
S5 Interface                      1
S8 Interface                      0
All Interfaces                    1
```

## show unified-edge ggsn-pgw gtp peer statistics

**Syntax** **show unified-edge ggsn-pgw gtp peer statistics remote-address** *remote-address*
**<detail>**
**<fpc-slot** *fpc-slot***>**
**<gateway** *gateway***>**
**<gtp-all>**
**<gtp-v0>**
**<gtp-v1>**
**<gtp-v2>**
**<history>**
**<local-address** *local-address***>**
**<pic-slot** *pic-slot***>**
**<routing-instance** *routing-instance***>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
**gateway** option introduced in Junos OS Mobility Release 11.4W.

**Description** Display the GTP peer statistics for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then the status for all GGSNs and P-GWs is displayed.

**Options** **remote-address** *remote-address*—Display the GTP peer statistics for the peer with the specified remote address.

**detail**—(Optional) Display detailed statistics about GTP peers.

**fpc-slot** *fpc-slot*—(Optional) Display the GTP peer statistics for the specified FPC slot number.

**gateway** *gateway-name*—(Optional) Display the GTP peer statistics for the specified gateway.

**gtp-all**—(Optional) Display the statistics for GTP versions 0, 1, and 2.

**gtp-v0**—(Optional) Display the GTP version 0 statistics.

**gtp-v1**—(Optional) Display the GTP version 1 statistics.

**gtp-v2**—(Optional) Display the GTP version 2 statistics.

**history**—(Optional) Display the GTP peer statistics for peers which are no longer present on the gateway.

**local-address** *local-address*—(Optional) Display the GTP peer statistics for the local address of the specified peer on the S-GW.

**pic-slot** *pic-slot*—(Optional) Display the GTP peer statistics for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**routing-instance** *routing-instance*—(Optional) Display the GTP peer statistics for the peer on the specified routing instance.

**Required Privilege Level** view

**Related Documentation**
- clear unified-edge ggsn-pgw gtp peer statistics on page 1290
- show unified-edge ggsn-pgw gtp peer on page 1295
- show unified-edge ggsn-pgw gtp statistics on page 1309

**List of Sample Output**
show unified-edge ggsn-pgw gtp peer statistics remote-address 17.1.1.1 on page 1302
show unified-edge ggsn-pgw gtp peer statistics remote-address 17.1.1.1 detail on page 1304

**Output Fields** See the output fields for the show unified-edge ggsn-pgw gtp statistics command.

## Sample Output

**show unified-edge ggsn-pgw gtp peer statistics remote-address 17.1.1.1**

```
user@host> show unified-edge ggsn-pgw gtp peer statistics remote-address 17.1.1.1
Gateway: PGW2

Global Packet Statistics
  Received Packets Dropped           : 0
  Packet Allocation Fail             : 0
  Packet Send Fail                   : 0
  IP Version Error Received          : 0
  IP Protocol Error Received         : 0
  GTP Port Error Received            : 0
  GTP Unknown Version Received       : 0
  Packet Length Error Received       : 0
  Unknown Messages Received          : 0

GTP Version 0 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 0
  T3 Response Timer Expires          : 0


  Message Type                                        Received        Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                            0               0
  Total number of bytes                               0               0
  Redirect messages                                   0               0
  Echo Request                                        0               0
  Echo Response                                       0               0
  Version Not Supported                               0               0
  Create PDP Context Request                          0               0
  Create PDP Context Response                         0               0
  Update PDP Context Request                          0               0
  Update PDP Context Response                         0               0
  Delete PDP Context Request                          0               0
  Delete PDP Context Response                         0               0

GTP Version 1 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 0
  T3 Response Timer Expires          : 0
```

```
  Message Type                                    Received        Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                        0               0
  Total number of bytes                           0               0
  Redirect messages                               0               0
  Echo Request                                    0               0
  Echo Response                                   0               0
  Version Not Supported                           0               0
  Create PDP Context Request                      0               0
  Create PDP Context Response                     0               0
  Update PDP Context Request                      0               0
  Update PDP Context Response                     0               0
  Delete PDP Context Request                      0               0
  Delete PDP Context Response                     0               0

GTP Version 2 Statistics:
-------------------------
  Protocol Error                    : 0
  Unsupported Messages Received     : 0
  T3 Response Timer Expires         : 0


  Message Type                                    Received        Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                        6               6
  Total number of bytes                           266             162
  Redirect messages                               0               0
  S11 piggyback messages                          0               0
  S4 piggyback messages                           0               0
  S5 piggyback messages                           0               0
  Echo Request                                    5               0
  Echo Response                                   0               5
  Version Not Supported                           0               0
  Create session request                          1               0
  Create session response                         0               1
  Modify bearer request                           0               0
  Modify bearer response                          0               0
  Delete session request                          0               0
  Delete session response                         0               0
  Create bearer request                           0               0
  Create bearer response                          0               0
  Update bearer request                           0               0
  Update bearer response                          0               0
  Delete bearer request                           0               0
  Delete bearer response                          0               0
  Delete PDN connection set request               0               0
  Delete PDN connection set response              0               0
  Update PDN connection set request               0               0
  Update PDN connection set response              0               0
  Modify bearer command                           0               0
  Modify bearer failure indication                0               0
  Delete bearer command                           0               0
  Delete bearer failure indication                0               0
  Bearer resource command                         0               0
  Bearer resource failure indication              0               0
  Change notification request                     0               0
  Change notification response                    0               0
  Release Access Bearer request                   0
        0
  Release Access Bearer response                  0
        0
```

```
  Suspend Notification                              0              0
  Suspend Acknowledge                               0              0
  Resume Notification                               0              0
  Resume Acknowledge                                0              0
  Create Indirect Data Forward Tunnel Request       0              0
  Create Indirect Data Forward Tunnel Response      0              0
  Delete Indirect Data Forward Tunnel Request       0              0
  Delete Indirect Data Forward Tunnel Response      0              0
  Downlink Data Notification                        0              0
  Downlink Data Notification ack                    0              0
  Downlink Data Notification fail                   0              0
  Stop paging indication                            0              0


Error Indication Statistics:
  Version                                           Received       Transmitted
  ------------------------------------------------------------------------------
  GTPv0                                             0              0
  GTPv1                                             0              0
```

### show unified-edge ggsn-pgw gtp peer statistics remote-address 17.1.1.1 detail

```
user@host> show unified-edge ggsn-pgw gtp peer statistics remote-address 17.1.1.1 detail
Gateway: PGW2

Global Packet Statistics
  Received Packets Dropped          : 0
  Packet Allocation Fail            : 0
  Packet Send Fail                  : 0
  IP Version Error Received         : 0
  IP Protocol Error Received        : 0
  GTP Port Error Received           : 0
  GTP Unknown Version Received      : 0
  Packet Length Error Received      : 0
  Unknown Messages Received         : 0

GTP Version 0 Statistics:
-------------------------
  Protocol Error                    : 0
  Unsupported Messages Received     : 0
  T3 Response Timer Expires         : 0


  Message Type                                      Received       Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                          0              0
  Total number of bytes                             0              0
  Redirect messages                                 0              0
  Echo Request                                      0              0
  Echo Response                                     0              0
  Version Not Supported                             0              0
  Create PDP Context Request                        0              0
  Create PDP Context Response                       0              0
  Update PDP Context Request                        0              0
  Update PDP Context Response                       0              0
  Delete PDP Context Request                        0              0
  Delete PDP Context Response                       0              0


  Cause Code                                        Received       Transmitted
  ------------------------------------------------------------------------------
  Request Accepted                                  0              0
```

```
  Non Existent                                    0               0
  Invalid Message Format                          0               0
  IMSI Not Known                                  0               0
  MS is GPRS Detached                             0               0
  MS is not GPRS Response                         0               0
  MS Refuses                                      0               0
  Version Not Supported                           0               0
  No Resource Available                           0               0
  Service Not Supported                           0               0
  Mandatory IE Incorrect                          0               0
  Mandatory IE Missing                            0               0
  Optional IE Incorrect                           0               0
  System Failure                                  0               0
  Roaming Restriction                             0               0
  P-TMSI Signature Mismatch                       0               0
  GPRS Connection Suspended                       0               0
  Authentication Failure                          0               0
  User Authentication Failed                      0               0

GTP Version 1 Statistics:
-------------------------
  Protocol Error                    : 0
  Unsupported Messages Received     : 0
  T3 Response Timer Expires         : 0

  Message Type                                    Received        Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                        0               0
  Total number of bytes                           0               0
  Redirect messages                               0               0
  Echo Request                                    0               0
  Echo Response                                   0               0
  Version Not Supported                           0               0
  Create PDP Context Request                      0               0
  Create PDP Context Response                     0               0
  Update PDP Context Request                      0               0
  Update PDP Context Response                     0               0
  Delete PDP Context Request                      0               0
  Delete PDP Context Response                     0               0

  Cause Code                                      Received        Transmitted
  ------------------------------------------------------------------------------
  Request Accepted                                0               0
  Non Existent                                    0               0
  Invalid Message Format                          0               0
  IMSI Not Known                                  0               0
  MS is GPRS Detached                             0               0
  MS is not GPRS Response                         0               0
  MS Refuses                                      0               0
  Version Not Supported                           0               0
  No Resource Available                           0               0
  Service Not Supported                           0               0
  Mandatory IE Incorrect                          0               0
  Mandatory IE Missing                            0               0
  Optional IE Incorrect                           0               0
  System Failure                                  0               0
  Roaming Restriction                             0               0
  P-TMSI Signature Mismatch                       0               0
  GPRS Connection Suspended                       0               0
```

```
  Authentication Failure                          0              0
  User Authentication Failed                      0              0
  Context not found                               0              0
  All dynamic PDP addresses are occupied          0              0
  No memory is available                          0              0
  Relocation failure                              0              0
  Unknown mandatory extension header              0              0
  Semantic error in the TFT operation             0              0
  Syntactic error in the TFT operation            0              0
  Semantic errors in packet filter(s)             0              0
  Syntactic errors in packet filter(s)            0              0
  Missing or unknown APN                          0              0
  Unknown PDP address or PDP type                 0              0
  PDP context without TFT already activated       0              0

GTP Version 2 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 0
  T3 Response Timer Expires          : 0


  Message Type                                    Received       Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                        7              7
  Total number of bytes                           279            175
  Redirect messages                               0              0
  S11 piggyback messages                          0              0
  S4 piggyback messages                           0              0
  S5 piggyback messages                           0              0
  Echo Request                                    6              0
  Echo Response                                   0              6
  Version Not Supported                           0              0
  Create session request                          1              0
  Create session response                         0              1
  Modify bearer request                           0              0
  Modify bearer response                          0              0
  Delete session request                          0              0
  Delete session response                         0              0
  Create bearer request                           0              0
  Create bearer response                          0              0
  Update bearer request                           0              0
  Update bearer response                          0              0
  Delete bearer request                           0              0
  Delete bearer response                          0              0
  Delete PDN connection set request               0              0
  Delete PDN connection set response              0              0
  Update PDN connection set request               0              0
  Update PDN connection set response              0              0
  Modify bearer command                           0              0
  Modify bearer failure indication                0              0
  Delete bearer command                           0              0
  Delete bearer failure indication                0              0
  Bearer resource command                         0              0
  Bearer resource failure indication              0              0
  Change notification request                     0              0
  Change notification response                    0              0
  Release Access Bearer request                   0
        0
  Release Access Bearer response                  0
        0
```

```
Suspend Notification                              0               0
Suspend Acknowledge                               0               0
Resume Notification                               0               0
Resume Acknowledge                                0               0
Create Indirect Data Forward Tunnel Request       0               0
Create Indirect Data Forward Tunnel Response      0               0
Delete Indirect Data Forward Tunnel Request       0               0
Delete Indirect Data Forward Tunnel Response      0               0
Downlink Data Notification                        0               0
Downlink Data Notification ack                    0               0
Downlink Data Notification fail                   0               0
Stop paging indication                            0               0


Cause Code                                        Received        Transmitted
-------------------------------------------------------------------------------
Request accepted                                  0               1
Request accepted partially                        0               0
New PDN type due to network preference            0               0
New PDN type due to single address bearer only    0               0
Local Detach                                      0               0
Complete Detach                                   0               0
RAT changed from 3GPP to Non 3GPP                 0               0
ISR Deactivated                                   0               0
Error Indication from RNC Enodeb                  0               0
Context Not Found                                 0               0
Invalid Message Format                            0               0
Version not supported by next peer                0               0
Invalid length                                    0               0
Service not supported                             0               0
Mandatory IE incorrect                            0               0
Mandatory IE missing                              0               0
Optional IE incorrect                             0               0
System failure                                    0               0
No resources available                            0               0
Semantic error in the TFT operation               0               0
Syntactic error in the TFT operation              0               0
Semantic errors in packet filter(s)               0               0
Syntactic errors in packet filter(s)              0               0
Missing or unknown APN                            0               0
Unexpected repeated IE                            0               0
GRE key not found                                 0               0
Reallocation failure                              0               0
Denied in RAT                                     0               0
Preferred PDN type not supported                  0               0
All dynamic addresses are occupied                0               0
UE context without TFT already activated          0               0
Protocol type not supported                       0               0
UE not responding                                 0               0
UE refuses                                        0               0
Service denied                                    0               0
Unable to page UE                                 0               0
No memory available                               0               0
User authentication failed                        0               0
APN access denied - no subscription               0               0
Request rejected                                  0               0
P-TMSI Signature Mismatch                         0               0
IMSI Not Known                                    0               0
Semantic Error in the TAD Operation               0               0
Syntactic Error in the TAD Operation              0               0
Reserved Message Value Received                   0               0
```

```
  Rmt Peer Not Responding                          0              0
  Collision with Network Initiated Request         0              0
  Unable to Page UE due to Suspension              0              0
  Conditional IE Missing                           0              0
  APN Restriction Type Incompatible                0              0
  Invalid Total len                                0              0
  Data Forwarding Not Supported                    0              0
  Invalid Reply from Rmt Peer                      0              0
  Invalid Peer                                     0              0
  Unknown                                          0              0


Error Indication Statistics:
  Version                                          Received       Transmitted
  ---------------------------------------------------------------------------
  GTPv0                                            0              0
  GTPv1                                            0              0
```

## show unified-edge ggsn-pgw gtp statistics

**Syntax**

**show unified-edge ggsn-pgw gtp statistics**
<**detail**>
<**fpc-slot** *fpc-slot*>
<**gateway** *gateway*>
<**gn**>
<**gp**>
<**pic-slot** *pic-slot*>
<**s5**>
<**s8**>
<**v0**>
<**v1**>
<**v2**>

**Release Information**

Statement introduced in Junos OS Mobility Release 11.2W. **gn**, **gp**, **s5**, and **s8** attributes introduced in Junos OS Mobility Release 11.4W.

**Description**

Display the global GTP statistics for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then the status for all GGSNs and P-GWs is displayed.

**Options**

**none**—Display the statistics for GTP versions 0, 1, and 2, in brief.

**detail**—(Optional) Display the GTP statistics with the GTP cause statistics included.

**fpc-slot** ***fpc-slot***—(Optional) Display the GTP statistics for the specified FPC slot number.

**gateway** ***gateway-name***—(Optional) Display the GTP statistics for the specified gateway.

**gn**—Display the GTP statistics for only the gn interface.

**gn**—Display the GTP statistics for only the gp interface.

**pic-slot** ***pic-slot***—(Optional) Display the GTP statistics for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**s5**—Display the GTP statistics for only the s5 interface.

**s8**—Display the GTP statistics for only the s8 interface.

**v0**—(Optional) Display GTP version 0 statistics.

**v1**—(Optional) Display GTP version 1 statistics.

**v2**—(Optional) Display GTP version 2 statistics.

**Required Privilege Level**

view

**Related Documentation**

- clear unified-edge ggsn-pgw gtp statistics on page 1292
- show unified-edge ggsn-pgw gtp peer statistics on page 1301

**List of Sample Output** show unified-edge ggsn-pgw gtp statistics on page 1312
show unified-edge ggsn-pgw gtp statistics detail on page 1314

**Output Fields** Table 113 on page 1310 lists the output fields for the **show unified-edge sgw gtp statistics** command. Output fields are listed in the approximate order in which they appear.

### Table 113: show unified-edge sgw gtp statistics Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the GGSN or P-GW. | All levels |
| Global Packet Statistics | | |
| **Received Packets Dropped** | Total number of packets received by the GGSN or P-GW that were dropped. | All levels |
| **Packet Allocation Fail** | Number of times that packet allocation failed. | All levels |
| **Packet Send Fail** | Number of times that packet sending failed. | All levels |
| **IP Version Error Received** | Number of packets with an unsupported IP version. | All levels |
| **IP Protocol Error Received** | Number of non-UDP IP packets received. | All levels |
| **GTP Port Error Received** | Number of packets received on a unknown GTP port number. | All levels |
| **GTP Unknown Version Received** | Number of GTP packets with an incorrect GTP version. | All levels |
| **Packet Length Error Received** | Number of GTP packets with an incorrect length in the IP or UDP header. | All levels |
| **Unknown Messages Received** | Number of GTP messages received that are not recognized by the gateway. | All levels |
| GTP Version 0 Statistics | | |
| **Protocol Error** | Number of messages received that had a protocol error. This counter is incremented if a message with an invalid or unknown GTP message type is received. | All levels |
| **Unsupported Messages Received** | Number of unsupported messages received. This counter is incremented if the message is invalid for the interface on which the message is received. | All levels |
| **T3 Response Timer Expires** | Number of messages for which the T3 response timer elapsed. | All levels |
| **Message Type** | Type of the GTP message; for example, **Echo Request** or **Create PDP Context Request**. | All levels |
| **Received** | Number of GTP messages received corresponding to the message type. | All levels |

Table 113: show unified-edge sgw gtp statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Transmitted** | Number of GTP messages transmitted corresponding to the message type. | All levels |
| **Cause Code** | GTP cause codes; for example, **Request accepted** or **Invalid Message Format**. | **detail** |
| **Received** | Number of GTP messages received corresponding to the GTP cause code. | **detail** |
| **Transmitted** | Number of GTP messages transmitted corresponding to the GTP cause code. | **detail** |
| GTP Version 1 Statistics | | |
| **Protocol Error** | Number of messages received that had a protocol error. This counter is incremented if a message with an invalid or unknown GTP message type is received. | All levels |
| **Unsupported Messages Received** | Number of unsupported messages received. This counter is incremented if the message is invalid for the interface on which the message is received. | All levels |
| **T3 Response Timer Expires** | Number of messages for which the T3 response timer elapsed. | All levels |
| **Message Type** | Type of the GTP message; for example, **Echo Request** or **Create PDP Context Request** . | All levels |
| **Received** | Number of GTP messages received corresponding to the message type. | All levels |
| **Transmitted** | Number of GTP messages transmitted corresponding to the message type. | All levels |
| **Cause Code** | GTP cause codes; for example, **Request accepted** or **Invalid Message Format**. | **detail** |
| **Received** | Number of GTP messages received corresponding to the GTP cause code. | **detail** |
| **Transmitted** | Number of GTP messages transmitted corresponding to the GTP cause code. | **detail** |
| GTP Version 2 Statistics | | |
| **Protocol Error** | Number of messages received that had a protocol error. This counter is incremented if a message with an invalid or unknown GTP message type is received. | All levels |
| **Unsupported Messages Received** | Number of unsupported messages received. This counter is incremented if the message is invalid for the interface on which the message is received. | All levels |

Table 113: show unified-edge sgw gtp statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **T3 Response Timer Expires** | Number of messages for which the T3 response timer elapsed. | All levels |
| **Message Type** | Type of the GTP message; for example, **Echo Request** or **Create PDP Context Request** . | All levels |
| **Received** | Number of GTP messages received corresponding to the message type. | All levels |
| **Transmitted** | Number of GTP messages transmitted corresponding to the message type. | All levels |
| **Cause Code** | GTP cause codes; for example, **Request accepted** or **Invalid Message Format**. | **detail** |
| **Received** | Number of GTP messages received corresponding to the GTP cause code. | **detail** |
| **Transmitted** | Number of GTP messages transmitted corresponding to the GTP cause code. | **detail** |

## Sample Output

**show unified-edge ggsn-pgw gtp statistics**

```
user@host> show unified-edge ggsn-pgw gtp statistics
Gateway: PGW

Global Packet Statistics
  Received Packets Dropped           : 0
  Packet Allocation Fail             : 0
  Packet Send Fail                   : 0
  IP Version Error Received          : 0
  IP Protocol Error Received         : 0
  GTP Port Error Received            : 0
  GTP Unknown Version Received       : 0
  Packet Length Error Received       : 0
  Unknown Messages Received          : 0

GTP Version 0 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 0
  T3 Response Timer Expires          : 0


  Message Type                                          Received        Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                              0               0
  Total number of bytes                                 0               0
  Redirect messages                                     0               0
  Echo Request                                          0               0
  Echo Response                                         0               0
  Version Not Supported                                 0               0
  Create PDP Context Request                            0               0
  Create PDP Context Response                           0               0
```

```
  Update PDP Context Request                          0              0
  Update PDP Context Response                         0              0
  Delete PDP Context Request                          0              0
  Delete PDP Context Response                         0              0
  Error Indication Messages                           0              0

GTP Version 1 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 0
  T3 Response Timer Expires          : 128


  Message Type                                        Received       Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                            247            378
  Total number of bytes                               1122           10384
  Redirect messages                                   0              0
  Echo Request                                        180            196
  Echo Response                                       67             180
  Version Not Supported                               0              0
  Create PDP Context Request                          0              0
  Create PDP Context Response                         0              0
  Update PDP Context Request                          0              0
  Update PDP Context Response                         0              0
  Delete PDP Context Request                          0              0
  Delete PDP Context Response                         0              0
  Error Indication Messages                           0              0

GTP Version 2 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 5
  T3 Response Timer Expires          : 0


  Message Type                                        Received       Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                            366            366
  Total number of bytes                               5103           10487
  Redirect messages                                   0              0
  S11 piggyback messages                              0              0
  S4 piggyback messages                               0              0
  S5 piggyback messages                               0              0
  Echo Request                                        187            145
  Echo Response                                       145            187
  Version Not Supported                               0              0
  Create session request                              6              3
  Create session response                             3              6
  Modify bearer request                               5              0
  Modify bearer response                              0              5
  Delete session request                              4              2
  Delete session response                             2              4
  Create bearer request                               0              0
  Create bearer response                              0              0
  Update bearer request                               0              0
  Update bearer response                              0              0
  Delete bearer request                               0              0
  Delete bearer response                              0              0
  Delete PDN connection set request                   0              0
  Delete PDN connection set response                  0              0
```

```
  Update PDN connection set request                0              0
  Update PDN connection set response               0              0
  Modify bearer command                            0              0
  Modify bearer failure indication                 0              0
  Delete bearer command                            0              0
  Delete bearer failure indication                 0              0
  Bearer resource command                          0              0
  Bearer resource failure indication               0              0
  Change notification request                      0              0
  Change notification response                     0              0
  Release Access Bearer request                    0              0
  Release Access Bearer response                   0              0
  Suspend Notification                             0              0
  Suspend Acknowledge                              0              0
  Resume Notification                              0              0
  Resume Acknowledge                               0              0
  Create Indirect Data Forward Tunnel Request      12             0
  Create Indirect Data Forward Tunnel Response     0              12
  Delete Indirect Data Forward Tunnel Request      2              0
  Delete Indirect Data Forward Tunnel Response     0              2
  Downlink Data Notification                       0              0
  Downlink Data Notification ack                   0              0
  Downlink Data Notification fail                  0              0
  Stop paging indication                           0              0
```

## show unified-edge ggsn-pgw gtp statistics detail

```
user@host> show unified-edge ggsn-pgw gtp statistics detail
Gateway: PGW2

Global Packet Statistics
  Received Packets Dropped           : 0
  Packet Allocation Fail             : 0
  Packet Send Fail                   : 0
  IP Version Error Received          : 0
  IP Protocol Error Received         : 0
  GTP Port Error Received            : 0
  GTP Unknown Version Received       : 0
  Packet Length Error Received       : 0
  Unknown Messages Received          : 0

GTP Version 0 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 0
  T3 Response Timer Expires          : 0


  Message Type                                          Received       Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                              0              0
  Total number of bytes                                 0              0
  Redirect messages                                     0              0
  Echo Request                                          0              0
  Echo Response                                         0              0
  Version Not Supported                                 0              0
  Create PDP Context Request                            0              0
  Create PDP Context Response                           0              0
  Update PDP Context Request                            0              0
  Update PDP Context Response                           0              0
  Delete PDP Context Request                            0              0
```

```
  Delete PDP Context Response                          0              0
  Error Indication Messages                            0              0


  Cause Code                                           Received       Transmitted
  ------------------------------------------------------------------------------
  Request Accepted                                     0              0
  Non Existent                                         0              0
  Invalid Message Format                               0              0
  IMSI Not Known                                       0              0
  MS is GPRS Detached                                  0              0
  MS is not GPRS Response                              0              0
  MS Refuses                                           0              0
  Version Not Supported                                0              0
  No Resource Available                                0              0
  Service Not Supported                                0              0
  Mandatory IE Incorrect                               0              0
  Mandatory IE Missing                                 0              0
  Optional IE Incorrect                                0              0
  System Failure                                       0              0
  Roaming Restriction                                  0              0
  P-TMSI Signature Mismatch                            0              0
  GPRS Connection Suspended                            0              0
  Authentication Failure                               0              0
  User Authentication Failed                           0              0

GTP Version 1 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 0
  T3 Response Timer Expires          : 0


  Message Type                                         Received       Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                             0              0
  Total number of bytes                                0              0
  Redirect messages                                    0              0
  Echo Request                                         0              0
  Echo Response                                        0              0
  Version Not Supported                                0              0
  Create PDP Context Request                           0              0
  Create PDP Context Response                          0              0
  Update PDP Context Request                           0              0
  Update PDP Context Response                          0              0
  Delete PDP Context Request                           0              0
  Delete PDP Context Response                          0              0
  Error Indication Messages                            0              0


  Cause Code                                           Received       Transmitted
  ------------------------------------------------------------------------------
  Request Accepted                                     0              0
  Non Existent                                         0              0
  Invalid Message Format                               0              0
  IMSI Not Known                                       0              0
  MS is GPRS Detached                                  0              0
  MS is not GPRS Response                              0              0
  MS Refuses                                           0              0
  Version Not Supported                                0              0
  No Resource Available                                0              0
```

```
  Service Not Supported                              0              0
  Mandatory IE Incorrect                             0              0
  Mandatory IE Missing                               0              0
  Optional IE Incorrect                              0              0
  System Failure                                     0              0
  Roaming Restriction                                0              0
  P-TMSI Signature Mismatch                          0              0
  GPRS Connection Suspended                          0              0
  Authentication Failure                             0              0
  User Authentication Failed                         0              0
  Context not found                                  0              0
  All dynamic PDP addresses are occupied             0              0
  No memory is available                             0              0
  Relocation failure                                 0              0
  Unknown mandatory extension header                 0              0
  Semantic error in the TFT operation                0              0
  Syntactic error in the TFT operation               0              0
  Semantic errors in packet filter(s)                0              0
  Syntactic errors in packet filter(s)               0              0
  Missing or unknown APN                             0              0
  Unknown PDP address or PDP type                    0              0
  PDP context without TFT already activated          0              0

GTP Version 2 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 0
  T3 Response Timer Expires          : 0

  Message Type                                       Received       Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                           16             16
  Total number of bytes                              332            292
  Redirect messages                                  0              0
  S11 piggyback messages                             0              0
  S4 piggyback messages                              0              0
  S5 piggyback messages                              0              0
  Echo Request                                       15             0
  Echo Response                                      0              15
  Version Not Supported                              0              0
  Create session request                             1              0
  Create session response                            0              1
  Modify bearer request                              0              0
  Modify bearer response                             0              0
  Delete session request                             0              0
  Delete session response                            0              0
  Create bearer request                              0              0
  Create bearer response                             0              0
  Update bearer request                              0              0
  Update bearer response                             0              0
  Delete bearer request                              0              0
  Delete bearer response                             0              0
  Delete PDN connection set request                  0              0
  Delete PDN connection set response                 0              0
  Update PDN connection set request                  0              0
  Update PDN connection set response                 0              0
  Modify bearer command                              0              0
  Modify bearer failure indication                   0              0
  Delete bearer command                              0              0
  Delete bearer failure indication                   0              0
```

```
Bearer resource command                          0              0
Bearer resource failure indication               0              0
Change notification request                      0              0
Change notification response                     0              0
Release Access Bearer request                    0              0
Release Access Bearer response                   0              0
Suspend Notification                             0              0
Suspend Acknowledge                              0              0
Resume Notification                              0              0
Resume Acknowledge                               0              0
Create Indirect Data Forward Tunnel Request      0              0
Create Indirect Data Forward Tunnel Response     0              0
Delete Indirect Data Forward Tunnel Request      0              0
Delete Indirect Data Forward Tunnel Response     0              0
Downlink Data Notification                       0              0
Downlink Data Notification ack                   0              0
Downlink Data Notification fail                  0              0
Stop paging indication                           0              0


Cause Code                                       Received       Transmitted
-------------------------------------------------------------------------------
Request accepted                                 0              1
Request accepted partially                       0              0
New PDN type due to network preference           0              0
New PDN type due to single address bearer only   0              0
Local Detach                                     0              0
Complete Detach                                  0              0
RAT changed from 3GPP to Non 3GPP                0              0
ISR Deactivated                                  0              0
Error Indication from RNC Enodeb                 0              0
Context Not Found                                0              0
Invalid Message Format                           0              0
Version not supported by next peer               0              0
Invalid length                                   0              0
Service not supported                            0              0
Mandatory IE incorrect                           0              0
Mandatory IE missing                             0              0
Optional IE incorrect                            0              0
System failure                                   0              0
No resources available                           0              0
Semantic error in the TFT operation              0              0
Syntactic error in the TFT operation             0              0
Semantic errors in packet filter(s)              0              0
Syntactic errors in packet filter(s)             0              0
Missing or unknown APN                           0              0
Unexpected repeated IE                           0              0
GRE key not found                                0              0
Reallocation failure                             0              0
Denied in RAT                                    0              0
Preferred PDN type not supported                 0              0
All dynamic addresses are occupied               0              0
UE context without TFT already activated         0              0
Protocol type not supported                      0              0
UE not responding                                0              0
UE refuses                                       0              0
Service denied                                   0              0
Unable to page UE                                0              0
No memory available                              0              0
User authentication failed                       0              0
APN access denied - no subscription              0              0
```

| | | |
|---|---|---|
| Request rejected | 0 | 0 |
| P-TMSI Signature Mismatch | 0 | 0 |
| IMSI Not Known | 0 | 0 |
| Semantic Error in the TAD Operation | 0 | 0 |
| Syntactic Error in the TAD Operation | 0 | 0 |
| Reserved Message Value Received | 0 | 0 |
| Remote Peer Not Responding | 0 | 0 |
| Collision with Network Initiated Request | 0 | 0 |
| Unable to Page UE due to Suspension | 0 | 0 |
| Conditional IE Missing | 0 | 0 |
| APN Restriction Type Incompatible | 0 | 0 |
| Invalid Total len | 0 | 0 |
| Data Forwarding Not Supported | 0 | 0 |
| Invalid Reply from Remote Peer | 0 | 0 |
| Invalid Peer | 0 | 0 |
| Unknown | 0 | 0 |

## show unified-edge sgw gtp peer

**Syntax** **show unified-edge sgw gtp peer**
<detail>
<fpc-slot *fpc-slot*>
<gateway *gateway*>
<history>
<local-address *local-address*>
<pic-slot *pic-slot*>
<remote-address *remote-address*>
<routing-instance *routing-instance*>
<s11>
<s12>
<s1u>
<s4>
<s5>
<s8>

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the information about GTP peers for one or more Serving Gateways (S-GWs). If a gateway is not specified, then the information for all S-GWs is displayed.

**Options** **none**—Display the GTP peer information in brief.

**detail**—(Optional) Display detailed information about GTP peers.

**fpc-slot *fpc-slot***—(Optional) Display the GTP peer information for the specified FPC slot number.

**gateway *gateway-name***—(Optional) Display the GTP peer information for the specified gateway.

**history**—(Optional) Display the GTP peer information for peers that are no longer present on the gateway.

**local-address *local-address***—(Optional) Display the GTP peer information for the local address of the specified peer on the S-GW.

**pic-slot *pic-slot***—(Optional) Display the GTP peer information for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**remote-address *remote-address***—(Optional) Display the GTP peer information for the peer with the specified remote address.

**routing-instance *routing-instance***—(Optional) Display the GTP information for the peer on the specified routing instance name.

NOTE: If you specify the routing instance, you must also specify the remote address of the peer.

**s11**—Display the information about GTP peers on the s11 interface.

**s12**—Display the information about GTP peers on the s12 interface.

**s1u**—Display the information about GTP peers on the s1u interface.

**s5**—Display the information about GTP peers on the s5 interface.

**s8**—Display the information about GTP peers on the s8 interface.

**Required Privilege Level** view

**Related Documentation**

- clear unified-edge sgw gtp peer statistics on page 1293
- show unified-edge sgw gtp peer count on page 1324
- show unified-edge sgw gtp peer statistics on page 1325

**List of Sample Output**

show unified-edge sgw gtp peer on page 1322
show unified-edge sgw gtp peer detail on page 1322

**Output Fields** Table 114 on page 1320 lists the output fields for the **show unified-edge sgw gtp peer** command. Output fields are listed in the approximate order in which they appear.

Table 114: show unified-edge sgw gtp peer Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the S-GW for which the GTP peer information is displayed. | All levels |
| **Remote IP Address** | Remote IP address of the GTP peer. | All levels |
| **Local IP Address** | Local IP address of the GTP peer on the S-GW. | All levels |
| **Routing Instance** | Name of the routing instance on which the GTP peer is located. | All levels |
| **Interface Type** | Type of 3GPP interface; for example S11, S4, and so on. | **detail** |
| **GTP Version** | GTP version number. | **detail** |
| **RCM Registration Done** | This parameter is used internally by the S-GW. | **detail** |
| **Restart Counter Valid** | Indicates whether the restart counter of the peer is valid or not. | **detail** |
| **Restart Counter Value** | Current restart count of the peer. | **detail** |
| **Sent Restart Counter Value** | Restart counter value of the S-GW that was sent to the peer. | **detail** |
| **Control Path N3 Request** | Maximum number of times that the S-GW attempts to send a signaling request message to a control peer. | **detail** |

Table 114: show unified-edge sgw gtp peer Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Control Path T3 Timer** | Response timeout for GTP signaling request messages to a control peer. | **detail** |
| **Control Path Echo N3 Request** | Maximum number of retries of GTP echo request messages (for path management) to a control peer. | **detail** |
| **Control Path Echo T3 Timer** | Response timeout for GTP echo request messages (for path management) to a control peer. | **detail** |
| **Control Path Echo Interval** | Number of seconds that the S-GW waits before sending an echo request message (for path management) to its control peer (MME, S4-SGSN, or P-GW). | **detail** |
| **Control Path Management Enabled** | Indicates whether path management is enabled or not for the control plane. | **detail** |
| **Control Path State** | Path state of the GTP control plane:<br>• **Up**—Indicates that echo requests are being transmitted and responses are being received, which means that the peer is alive.<br>• **Down**—Indicates that echo requests are being transmitted but responses are not being received, which means that the peer is detected to be dead.<br>• **Not tracked**—Indicates that path management is disabled, which means that echo requests are not sent to the peer. | **detail** |
| **Control Path State** | Minimum response time, in microseconds, for GTP-C messages. | **detail** |
| **Control Max Response Time in usec** | Maximum response time, in microseconds, for GTP-C messages. | **detail** |
| **Control Avg Response Time in usec** | Average response time, in microseconds, for GTP-C messages. | **detail** |
| **Data Path Echo N3 Request** | Maximum number of retries of GTP echo request messages (for path management) to a data peer. | **detail** |
| **Data Path Echo T3 Timer** | Response timeout for GTP echo request messages (for path management) to a data peer. | **detail** |
| **Data Path Echo Interval** | Number of seconds that the S-GW waits before sending an echo request message (for path management) to its data peer. | **detail** |
| **Data Path Management Enabled** | Indicates whether path management is enabled or not for the data plane. | **detail** |

Table 114: show unified-edge sgw gtp peer Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Data Path State** | Path state of the GTP user plane:<br>• **Up**—Indicates that echo requests are being transmitted and responses are being received, which means that the peer is alive.<br>• **Down**—Indicates that echo requests are being transmitted but responses are not being received, which means that the peer is detected to be dead.<br>• **Not tracked**—Indicates that path management is disabled, which means that echo requests are not sent to the peer. | **detail** |
| **GTP-C using Short Sequence Number** | Indicates whether the peer is using the 16-bit-sequence number length. | **detail** |
| **Downlink Data Notification Delay Interval** | Downlink data notification delay received from the MME. | **detail** |
| **Is CSID Supported** | Indicates whether the connection set identifier (CSID) is supported by peer or not. | **detail** |

## Sample Output

**show unified-edge sgw gtp peer**

```
user@host> show unified-edge sgw gtp peer
Gateway: SGW
Remote IP Address       Local IP Address       Routing Instance
------------------------------------------------------------------------
136.6.6.2                    200.6.88.2             default
10.10.1.2                    200.6.88.2             default
200.6.88.1                   200.6.88.2             default
```

**show unified-edge sgw gtp peer detail**

```
user@host> show unified-edge sgw gtp peer detail
Gateway: SGW
Peer Detail:
---------------
Remote IP Address                          : 136.6.6.2
Local IP Address                           : 200.6.88.2
Local IP Address                           : 17.1.1.2
Routing Instance                           : default
Interface Type                             : S1U
GTP Version                                : 1
RCM Registration Done                      : yes
Restart Counter Valid                      : no
Restart Counter Value                      : 0
Sent Restart Counter Value                 : 29
Control Path N3 Request                    : 5
Control Path T3 Timer                      : 25
Control Path Echo N3 Request               : 3
Control Path Echo T3 Timer                 : 15
Control Path Echo Interval                 : 65
Control Path Management Enabled            : yes
Control Path State                         : not-tracked
Control Min Response Time in usec          : 0
Control Max Response Time in usec          : 0
```

```
Control Avg Response Time in usec           : 0
Data Path Echo N3 Request                   : 5
Data Path Echo T3 Timer                     : 15
Data Path Echo Interval                     : 70
Data Path Management Enabled                : yes
Data Path State                             : down
GTP-C using Short Sequence Number           : no
Downlink Data Notification Delay Interval   : 0
CSID Supported                              : no

[...output truncated...]
```

## show unified-edge sgw gtp peer count

**Syntax** **show unified-edge sgw gtp peer count**

**Release Information** Statement introduced in Junos OS Mobility Release 11.4W.

**Description** Display the number of GTP peers on each interface and the total number of GTP peers for one or more Serving Gateways (S-GWs).

**Options** This command has no options.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge sgw gtp peer on page 1319

**List of Sample Output** show unified-edge sgw gtp peer count on page 1324

**Output Fields** Table 115 on page 1324 lists the output fields for the **show unified-edge sgw gtp peer count** command. Output fields are listed in the approximate order in which they appear.

Table 115: show unified-edge sgw gtp peer Output Fields

| Field Name | Field Description |
|---|---|
| Interface Name | Name of the interface (S1u, S11, S12, S4, S5, S8, and All) for which the GTP peer count is displayed. |
| Peer Count | The number of peers corresponding to the interface name (S1u, S11, S12, S4, S5, S8, and All) is displayed. |

### Sample Output

**show unified-edge sgw gtp peer count**

```
user@host> show unified-edge sgw gtp peer count
Gateway: SGW
Interface Name           Peer Count
-----------------------------------
S1u Interface                    1
S11 Interface                    1
S12 Interface                    0
S4 Interface                     0
S5 Interface                     1
S8 Interface                     0
All Interfaces                   3
```

## show unified-edge sgw gtp peer statistics

**Syntax**

**show unified-edge sgw gtp peer statistics remote-address** *remote-address*
<**detail**>
<**fpc-slot** *fpc-slot*>
<**gateway** *gateway*>
<**local-address** *local-address*>
<**pic-slot** *pic-slot*>
<**routing-instance** *routing-instance*>

**Release Information**

Command introduced in Junos OS Mobility Release 11.4W.

**Description**

Display the GTP peer statistics for one or more Serving Gateways (S-GWs). If a gateway is not specified, then the statistics for all the S-GWs is displayed.

**Options**

**remote-address** *remote-address*—Display the GTP peer statistics for the peer with the specified remote address.

**detail**—(Optional) Display detailed statistics about GTP peers.

**fpc-slot** *fpc-slot*—(Optional) Display the GTP peer statistics for the specified FPC slot number.

**gateway** *gateway-name*—(Optional) Display the GTP peer statistics for the specified gateway.

**local-address** *local-address*—(Optional) Display the GTP peer statistics for the local address of the specified peer on the S-GW.

**pic-slot** *pic-slot*—(Optional) Display the GTP peer for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**routing-instance** *routing-instance*—(Optional) Display the GTP peer statistics for the peer on the specified routing instance.

**Required Privilege Level**

view

**Related Documentation**

- clear unified-edge sgw gtp peer statistics on page 1293
- show unified-edge sgw gtp peer on page 1319
- show unified-edge sgw gtp statistics on page 1330

**List of Sample Output**

show unified-edge sgw gtp peer statistics remote-address 136.6.6.2 on page 1326
show unified-edge sgw gtp peer statistics remote-address 136.6.6.2 detail on page 1327

**Output Fields**

See the output fields for the **show unified-edge sgw gtp statistics** command.

## Sample Output

**show unified-edge sgw gtp peer statistics remote-address 136.6.6.2**

```
user@host> show unified-edge sgw gtp peer statistics remote-address 136.6.6.2
Gateway: SGW

Global Packet Statistics
  Received Packets Dropped           : 0
  Packet Allocation Fail             : 0
  Packet Send Fail                   : 0
  IP Version Error Received          : 0
  IP Protocol Error Received         : 0
  GTP Port Error Received            : 0
  GTP Unknown Version Received       : 0
  Packet Length Error Received       : 0
  Unknown Messages Received          : 0


GTP Version 2 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 0


  Message Type                                          Received        Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                              25              25
  Total number of bytes                                 325             1025
  Redirect messages                                     0               0
  S11 piggyback messages                                0               0
  S4 piggyback messages                                 0               0
  S5 piggyback messages                                 0               0
  Echo Request                                          0               25
  Echo Response                                         25              0
  Version Not Supported                                 0               0
  Create session request                                0               0
  Create session response                               0               0
  Modify bearer request                                 0               0
  Modify bearer response                                0               0
  Delete session request                                0               0
  Delete session response                               0               0
  Create bearer request                                 0               0
  Create bearer response                                0               0
  Update bearer request                                 0               0
  Update bearer response                                0               0
  Delete bearer request                                 0               0
  Delete bearer response                                0               0
  Delete PDN connection set request                     0               0
  Delete PDN connection set response                    0               0
  Update PDN connection set request                     0               0
  Update PDN connection set response                    0               0
  Modify bearer command                                 0               0
  Modify bearer failure indication                      0               0
  Delete bearer command                                 0               0
  Delete bearer failure indication                      0               0
  Bearer resource command                               0               0
  Bearer resource failure indication                    0               0
  Change notification request                           0               0
  Change notification response                          0               0
  Release Access Bearer request                         0               0
```

```
  Release Access Bearer response                    0              0

  Suspend Notification                              0              0
  Suspend Acknowledge                               0              0
  Resume Notification                               0              0
  Resume Acknowledge                                0              0
  Create Indirect Data Forward Tunnel Request       0              0
  Create Indirect Data Forward Tunnel Response      0              0
  Delete Indirect Data Forward Tunnel Request       0              0
  Delete Indirect Data Forward Tunnel Response      0              0
  Downlink Data Notification                        0              0
  Downlink Data Notification ack                    0              0
  Downlink Data Notification fail                   0              0
  Stop paging indication                            0              0
```

### show unified-edge sgw gtp peer statistics remote-address 136.6.6.2 detail

```
user@host> show unified-edge sgw gtp peer statistics remote-address 136.6.6.2 detail
Gateway: SGW

Global Packet Statistics
  Received Packets Dropped           : 0
  Packet Allocation Fail             : 0
  Packet Send Fail                   : 0
  IP Version Error Received          : 0
  IP Protocol Error Received         : 0
  GTP Port Error Received            : 0
  GTP Unknown Version Received       : 0
  Packet Length Error Received       : 0
  Unknown Messages Received          : 0

GTP Version 2 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 0
  T3 Response Timer Expires          : 0

  Message Type                                      Received       Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                          26             26
  Total number of bytes                             338            1066
  Redirect messages                                 0              0
  S11 piggyback messages                            0              0
  S4 piggyback messages                             0              0
  S5 piggyback messages                             0              0
  Echo Request                                      0              26
  Echo Response                                     26             0
  Version Not Supported                             0              0
  Create session request                            0              0
  Create session response                           0              0
  Modify bearer request                             0              0
  Modify bearer response                            0              0
  Delete session request                            0              0
  Delete session response                           0              0
  Create bearer request                             0              0
  Create bearer response                            0              0
  Update bearer request                             0              0
  Update bearer response                            0              0
  Delete bearer request                             0              0
  Delete bearer response                            0              0
  Delete PDN connection set request                 0              0
```

```
Delete PDN connection set response                0              0
Update PDN connection set request                 0              0
Update PDN connection set response                0              0
Modify bearer command                             0              0
Modify bearer failure indication                  0              0
Delete bearer command                             0              0
Delete bearer failure indication                  0              0
Bearer resource command                           0              0
Bearer resource failure indication                0              0
Change notification request                       0              0
Change notification response                      0              0
Release Access Bearer request                     0              0

Release Access Bearer response                    0              0

Suspend Notification                              0              0
Suspend Acknowledge                               0              0
Resume Notification                               0              0
Resume Acknowledge                                0              0
Create Indirect Data Forward Tunnel Request       0              0
Create Indirect Data Forward Tunnel Response      0              0
Delete Indirect Data Forward Tunnel Request       0              0
Delete Indirect Data Forward Tunnel Response      0              0
Downlink Data Notification                        0              0
Downlink Data Notification ack                    0              0
Downlink Data Notification fail                   0              0
Stop paging indication                            0              0


Cause Code                                        Received       Transmitted
-------------------------------------------------------------------------------
Request accepted                                  0              0
Request accepted partially                        0              0
New PDN type due to network preference            0              0
New PDN type due to single address bearer only    0              0
Local Detach                                      0              0
Complete Detach                                   0              0
RAT changed from 3GPP to Non 3GPP                 0              0
ISR Deactivated                                   0              0
Error Indication from RNC Enodeb                  0              0
Context Not Found                                 0              0
Invalid Message Format                            0              0
Version not supported by next peer                0              0
Invalid length                                    0              0
Service not supported                             0              0
Mandatory IE incorrect                            0              0
Mandatory IE missing                              0              0
Optional IE incorrect                             0              0
System failure                                    0              0
No resources available                            0              0
Semantic error in the TFT operation               0              0
Syntactic error in the TFT operation              0              0
Semantic errors in packet filter(s)               0              0
Syntactic errors in packet filter(s)              0              0
Missing or unknown APN                            0              0
Unexpected repeated IE                            0              0
GRE key not found                                 0              0
Reallocation failure                              0              0
Denied in RAT                                     0              0
Preferred PDN type not supported                  0              0
All dynamic addresses are occupied                0              0
```

| | | |
|---|---|---|
| UE context without TFT already activated | 0 | 0 |
| Protocol type not supported | 0 | 0 |
| UE not responding | 0 | 0 |
| UE refuses | 0 | 0 |
| Service denied | 0 | 0 |
| Unable to page UE | 0 | 0 |
| No memory available | 0 | 0 |
| User authentication failed | 0 | 0 |
| APN access denied - no subscription | 0 | 0 |
| Request rejected | 0 | 0 |
| P-TMSI Signature Mismatch | 0 | 0 |
| IMSI Not Known | 0 | 0 |
| Semantic Error in the TAD Operation | 0 | 0 |
| Syntactic Error in the TAD Operation | 0 | 0 |
| Reserved Message Value Received | 0 | 0 |
| Rmt Peer Not Responding | 0 | 0 |
| Collision with Network Initiated Request | 0 | 0 |
| Unable to Page UE due to Suspension | 0 | 0 |
| Conditional IE Missing | 0 | 0 |
| APN Restriction Type Incompatible | 0 | 0 |
| Invalid Total len | 0 | 0 |
| Data Forwarding Not Supported | 0 | 0 |
| Invalid Reply from Rmt Peer | 0 | 0 |
| Invalid Peer | 0 | 0 |
| Unknown | 0 | 0 |

## show unified-edge sgw gtp statistics

**Syntax**

**show unified-edge sgw gtp statistics**
<detail>
<fpc-slot *fpc-slot*>
<gateway *gateway*>
<pic-slot *pic-slot*>
<s11>
<s12>
<s1u>
<s4>
<s5>
<s8>
<v1>
<v2>

**Release Information**

Command introduced in Junos OS Mobility Release 11.4W.

**Description**

Display the global GTP statistics for one or more Serving Gateways (S-GWs). If a gateway is not specified, then statistics for all S-GWs are displayed.

**Options**

**none**—Display the GTP statistics in brief.

**detail**—(Optional) Display the GTP statistics with the GTP cause statistics included.

**fpc-slot *fpc-slot***—(Optional) Display the GTP statistics for the specified FPC slot number.

**gateway *gateway-name***—(Optional) Display the GTP statistics for the specified gateway.

**pic-slot *pic-slot***—(Optional) Display the GTP statistics for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**s11**—Display the GTP statistics for only the s11 interface.

**s12**—Display the GTP statistics for only the s12 interface.

**s1u**—Display the GTP statistics for only the s1u interface.

**s5**—Display the GTP statistics for only the s5 interface.

**s8**—Display the GTP statistics for only the s8 interface.

**v1**—(Optional) Display GTP version 1 statistics.

**v2**—(Optional) Display GTP version 2 statistics.

**Required Privilege Level**

view

**Related Documentation**

- clear unified-edge sgw gtp statistics on page 1294
- show unified-edge sgw gtp peer statistics on page 1325

**List of Sample Output** show unified-edge sgw gtp statistics on page 1332
show unified-edge sgw gtp statistics detail on page 1334

**Output Fields** Table 116 on page 1331 lists the output fields for the **show unified-edge sgw gtp statistics** command. Output fields are listed in the approximate order in which they appear.

### Table 116: show unified-edge sgw gtp statistics Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the S-GW. | All levels |
| Global Packet Statistics | | |
| **Received Packets Dropped** | Total number of packets received by the S-GW that were dropped. | All levels |
| **Packet Allocation Fail** | Number of times that packet allocation failed. | All levels |
| **Packet Send Fail** | Number of times that packet sending failed. | All levels |
| **IP Version Error Received** | Number of packets with an unsupported IP version. | All levels |
| **IP Protocol Error Received** | Number of non-UDP IP packets received. | All levels |
| **GTP Port Error Received** | Number of packets received on a unknown GTP port number. | All levels |
| **GTP Unknown Version Received** | Number of GTP packets with an incorrect GTP version. | All levels |
| **Packet Length Error Received** | Number of GTP packets with incorrect length in the IP or UDP header. | All levels |
| **Unknown Messages Received** | Number of GTP messages received that are not recognized by the S-GW. | All levels |
| **GTP Version 1 Statistics** | | |
| **Protocol Error** | Number of messages received that had a protocol error. This counter is incremented if a message with an invalid or unknown GTP message type is received. | All levels |
| **Unsupported Messages Received** | Number of unsupported messages received. This counter is incremented if the message is invalid for the interface on which the message is received. | All levels |
| **T3 Response Timer Expires** | Number of messages for which the T3 response timer elapsed. | All levels |
| **Message Type** | Type of the GTP message; for example, **Echo Request** or **Error Indication**. | All levels |
| **Received** | Number of GTP messages received corresponding to the message type. | All levels |
| **Transmitted** | Number of GTP messages transmitted corresponding to the message type. | All levels |

Table 116: show unified-edge sgw gtp statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| GTP Version 2 Statistics | | |
| **Protocol Error** | Number of messages received that had a protocol error. This counter is incremented if a message with an invalid or unknown GTP message type is received. | All levels |
| **Unsupported Messages Received** | Number of messages received that had a protocol error. This counter is incremented if a message with an invalid or unknown GTP message type is received. | All levels |
| **T3 Response Timer Expires** | Number of messages for which the T3 response timer elapsed. | All levels |
| **Message Type** | Type of the GTP message; for example, **S11 piggyback messages** or **Create session response**. | All levels |
| **Received** | Number of GTP messages received corresponding to the message type. | All levels |
| **Transmitted** | Number of GTP messages transmitted corresponding to the message type. | All levels |
| **Cause Code** | GTP cause codes; for example, **Request accepted** or **Missing or unknown APN**. | **detail** |
| **Received** | Number of GTP messages received corresponding to the GTP cause code. | **detail** |
| **Transmitted** | Number of GTP messages transmitted corresponding to the GTP cause code. | **detail** |

## Sample Output

**show unified-edge sgw gtp statistics**

```
user@host> show unified-edge sgw gtp statistics
Gateway: SGW

Global Packet Statistics
  Received Packets Dropped           : 0
  Packet Allocation Fail             : 0
  Packet Send Fail                   : 0
  IP Version Error Received          : 0
  IP Protocol Error Received         : 0
  GTP Port Error Received            : 0
  GTP Unknown Version Received       : 0
  Packet Length Error Received       : 0
  Unknown Messages Received          : 0

GTP Version 1 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 0
  T3 Response Timer Expires          : 0
```

```
  Message Type                                          Received        Transmitted
  ------------------------------------------------------------------------------
  End Marker                                            0               0
  Echo Request                                          0               0
  Echo Response                                         0               0
  Error Indication                                      0               0

GTP Version 2 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 0
  T3 Response Timer Expires          : 0


  Message Type                                          Received        Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                              923             924
  Total number of bytes                                 9191            13225
  Redirect messages                                     0               0
  S11 piggyback messages                                0               0
  S4 piggyback messages                                 0               0
  S5 piggyback messages                                 0               0
  Echo Request                                          907             0
  Echo Response                                         0               907
  Version Not Supported                                 0               0
  Create session request                                3               3
  Create session response                               3               3
  Modify bearer request                                 3               0
  Modify bearer response                                0               3
  Delete session request                                6               5
  Delete session response                               1               3
  Create bearer request                                 0               0
  Create bearer response                                0               0
  Update bearer request                                 0               0
  Update bearer response                                0               0
  Delete bearer request                                 0               0
  Delete bearer response                                0               0
  Delete PDN connection set request                     0               0
  Delete PDN connection set response                    0               0
  Update PDN connection set request                     0               0
  Update PDN connection set response                    0               0
  Modify bearer command                                 0               0
  Modify bearer failure indication                      0               0
  Delete bearer command                                 0               0
  Delete bearer failure indication                      0               0
  Bearer resource command                               0               0
  Bearer resource failure indication                    0               0
  Change notification request                           0               0
  Change notification response                          0               0
  Release Access Bearer request                         0               0
  Release Access Bearer response                        0               0
  Suspend Notification                                  0               0
  Suspend Acknowledge                                   0               0
  Resume Notification                                   0               0
  Resume Acknowledge                                    0               0
  Create Indirect Data Forward Tunnel Request           0               0
  Create Indirect Data Forward Tunnel Response          0               0
  Delete Indirect Data Forward Tunnel Request           0               0
  Delete Indirect Data Forward Tunnel Response          0               0
  Downlink Data Notification                            0               0
```

```
  Downlink Data Notification ack                    0               0
  Downlink Data Notification fail                   0               0
  Stop paging indication                            0               0
```

### show unified-edge sgw gtp statistics detail

```
user@host> show unified-edge sgw gtp statistics detail
Gateway: SGW

Global Packet Statistics
  Received Packets Dropped           : 0
  Packet Allocation Fail             : 0
  Packet Send Fail                   : 0
  IP Version Error Received          : 0
  IP Protocol Error Received         : 0
  GTP Port Error Received            : 0
  GTP Unknown Version Received       : 0
  Packet Length Error Received       : 0
  Unknown Messages Received          : 0

GTP Version 1 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 0
  T3 Response Timer Expires          : 0


  Message Type                                      Received        Transmitted
  ------------------------------------------------------------------------------
  End Marker                                        0               0
  Echo Request                                      0               0
  Echo Response                                     0               0
  Error Indication                                  0               0

GTP Version 2 Statistics:
-------------------------
  Protocol Error                     : 0
  Unsupported Messages Received      : 0
  T3 Response Timer Expires          : 0


  Message Type                                      Received        Transmitted
  ------------------------------------------------------------------------------
  Total number of messages                          925             926
  Total number of bytes                             9209            13251
  Redirect messages                                 0               0
  S11 piggyback messages                            0               0
  S4 piggyback messages                             0               0
  S5 piggyback messages                             0               0
  Echo Request                                      909             0
  Echo Response                                     0               909
  Version Not Supported                             0               0
  Create session request                            3               3
  Create session response                           3               3
  Modify bearer request                             3               0
  Modify bearer response                            0               3
  Delete session request                            6               5
  Delete session response                           1               3
  Create bearer request                             0               0
  Create bearer response                            0               0
  Update bearer request                             0               0
  Update bearer response                            0               0
```

```
Delete bearer request                              0              0
Delete bearer response                             0              0
Delete PDN connection set request                  0              0
Delete PDN connection set response                 0              0
Update PDN connection set request                  0              0
Update PDN connection set response                 0              0
Modify bearer command                              0              0
Modify bearer failure indication                   0              0
Delete bearer command                              0              0
Delete bearer failure indication                   0              0
Bearer resource command                            0              0
Bearer resource failure indication                 0              0
Release Access Bearer request                      0              0
Release Access Bearer response                     0              0
Suspend Notification                               0              0
Suspend Acknowledge                                0              0
Resume Notification                                0              0
Resume Acknowledge                                 0              0
Create Indirect Data Forward Tunnel Request        0              0
Create Indirect Data Forward Tunnel Response       0              0
Delete Indirect Data Forward Tunnel Request        0              0
Delete Indirect Data Forward Tunnel Response       0              0
Downlink Data Notification                         0              0
Downlink Data Notification ack                     0              0
Downlink Data Notification fail                    0              0
Stop paging indication                             0              0


Cause Code                                         Received       Transmitted
-------------------------------------------------------------------------------
Request accepted                                   4              9
Request accepted partially                         0              0
New PDN type due to network preference             0              0
New PDN type due to single address bearer only     0              0
Local Detach                                       0              0
Complete Detach                                    0              0
RAT changed from 3GPP to Non 3GPP                  0              0
ISR Deactivated                                    0              0
Error Indication from RNC Enodeb                   0              0
Context Not Found                                  0              0
Invalid Message Format                             0              0
Version not supported by next peer                 0              0
Invalid length                                     0              0
Service not supported                              0              0
Mandatory IE incorrect                             0              0
Mandatory IE missing                               0              0
Optional IE incorrect                              0              0
System failure                                     0              0
No resources available                             0              0
Semantic error in the TFT operation                0              0
Syntactic error in the TFT operation               0              0
Semantic errors in packet filter(s)                0              0
Syntactic errors in packet filter(s)               0              0
Missing or unknown APN                             0              0
Unexpected repeated IE                             0              0
GRE key not found                                  0              0
Reallocation failure                               0              0
Denied in RAT                                      0              0
Preferred PDN type not supported                   0              0
All dynamic addresses are occupied                 0              0
UE context without TFT already activated           0              0
```

| | | |
|---|---|---|
| Protocol type not supported | 0 | 0 |
| UE not responding | 0 | 0 |
| UE refuses | 0 | 0 |
| Service denied | 0 | 0 |
| Unable to page UE | 0 | 0 |
| No memory available | 0 | 0 |
| User authentication failed | 0 | 0 |
| APN access denied - no subscription | 0 | 0 |
| Request rejected | 0 | 0 |
| P-TMSI Signature Mismatch | 0 | 0 |
| IMSI Not Known | 0 | 0 |
| Semantic Error in the TAD Operation | 0 | 0 |
| Syntactic Error in the TAD Operation | 0 | 0 |
| Reserved Message Value Received | 0 | 0 |
| Remote Peer Not Responding | 0 | 0 |
| Collision with Network Initiated Request | 0 | 0 |
| Unable to Page UE due to Suspension | 0 | 0 |
| Conditional IE Missing | 0 | 0 |
| APN Restriction Type Incompatible | 0 | 0 |
| Invalid Total len | 0 | 0 |
| Data Forwarding Not Supported | 0 | 0 |
| Invalid Reply from Remote Peer | 0 | 0 |
| Invalid Peer | 0 | 0 |
| Unknown | 0 | 0 |

CHAPTER 36

# Service Applications Operational Commands

## show services flows (Aggregated Multiservices)

**Syntax**

**show services flows**
**<brief | extensive | terse>**
**<application-protocol** ***protocol*****>**
**<count>**
**<destination-port** ***destination-port*****>**
**<destination-prefix** ***destination-prefix*****>**
**<interface** ***interface-name*****>**
**<limit** ***number*****>**
**<protocol** ***protocol*****>**
**<service-set** ***service-set*****>**
**<source-port** ***source-port*****>**
**<source-prefix** ***source-prefix*****>**

**Release Information**

Command introduced in Junos OS Release 9.5.
Support for aggregated multiservices (AMS) introduced in Junos OS Mobility Release 11.2W.

**Description**

Display the flow session table entries for the active members of the AMS interface for services applications.

**Options**

**none**—Display standard information about all flows.

**brief | extensive | terse**—(Optional) Display the specified level of output.

**application-protocol**—(Optional) Display information about one of the following application protocols:

- **ftp**—File Transfer Protocol
- **icmp**—Internet Control Message Protocol
- **pptp**—Point-to-Point Tunneling Protocol
- **rtsp**—Real-Time Streaming Protocol
- **sqlnet**—SQL *Net
- **tcp**—Transmission Control Protocol
- **traceroute**—Traceroute
- **tftp**—Trivial File Transfer Protocol
- **udp**—User Datagram Protocol

**count**—(Optional) Display a count of the total number of flows of the service sets in each member interface of the AMS.

**destination-port** ***destination-port***—(Optional) Display information for the specified destination port. The range is from 0 through 65,535.

**destination-prefix** ***destination-prefix***—(Optional) Display information for the specified destination prefix.

**interface** ***interface-name***—(Optional) Display information about the specified interface. The **interface-name** is in the format **ms-*fpc/pic/port***.

**limit** ***number***—(Optional) Restrict the maximum number of entries displayed to the specified limit.

**protocol** ***protocol***—(Optional) Display information about one of the following IP types:

- ***number***—Numeric protocol value from 0 through 255
- **ah**—IPsec Authentication Header protocol
- **egp**—Exterior gateway protocol
- **esp**—IPsec Encapsulating Security Payload protocol
- **gre**—Generic routing encapsulation protocol
- **icmp**—Internet Control Message Protocol
- **icmp6**—Internet Control Message Protocol version 6
- **igmp**—Internet Group Management Protocol
- **ipip**—IP-over-IP encapsulation protocol
- **ospf**—Open Shortest Path First protocol
- **pim**—Protocol Independent Multicast protocol
- **rsvp**—Resource Reservation Protocol
- **sctp**—Stream Control Transmission Protocol
- **tcp**—Transmission Control Protocol
- **udp**—User Datagram Protocol

**service-set** ***service-set***—(Optional) Display information for the specified service set.

**source-port** ***source-port***—(Optional) Display information for the specified source port. The range is from 0 through 65,535.

**source-prefix** ***source-prefix***—(Optional) Display information for the specified source prefix.

**Required Privilege Level** view

**List of Sample Output**
show services flows interface ams0 on page 1340
show services flows count interface ams0 on page 1341

**Output Fields** Table 117 on page 1340 lists the output fields for the **show services flows** (aggregated multiservices) command. Output fields are listed in the approximate order in which they appear.

### Table 117: show services flows Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Interface** | Name of the aggregated multiservices member interface (**mams-**) and the aggregated multiservices interface (**ams**) to which it belongs. | All levels |
| **Service set** | Name of a service set. Individual empty service sets are not displayed. If no service set has any flows, a flow table header is displayed for each service set. | All levels |
| **Flow Count** | Number of flows in a session. | **count** only |
| **Flow or Flow Prot** | Protocol used for this flow. | All levels |
| **Source** | Source prefix of the flow in the format ***source-prefix:port***. For ICMP flows, port information is not displayed. | All levels |
| **Dest** | Destination prefix of the flow. For ICMP flows, port information is not displayed. | All levels |
| **State** | Status of the flow:<br>• **Drop**—Drop all packets in the flow without response.<br>• **Forward**—Forward the packet in the flow without looking at it.<br>• **Reject**—Drop all packets in the flow with response.<br>• **Watch**—Inspect packets in the flow. | All levels |
| **Dir** | Direction of the flow: input **(I)** or output **(O)**. | All levels |
| **Frm count** | Number of frames in the flow. | All levels |
| **Byte count** | Number of bytes in the flow. | **extensive** |
| **Flow role** | Flow role. | **extensive** |
| **Timeout** | Timeout value. | **extensive** |
| **Flow path** | Flow path: symmetric or asymmetric. | **extensive** |

## Sample Output

**show services flows interface ams0**

```
user@host> show services flows interface ams0
Interface: mams-1/0/0 (ams0), Service set: napt_set
Flow                                                  State    Dir       Frm count
UDP         30.30.30.2:63     ->     40.40.40.2:63    Forward  I           83185
UDP         40.40.40.2:63     ->   30.30.30.160:6000  Forward  O               0
```

**show services flows count interface ams0**

```
user@host> show services flows count interface ams0
Interface   Service set                                    Flow count
mams-1/0/0  napt_set                                               38
mams-1/0/0  ss1                                                     0
mams-1/1/0  napt_set                                               36
mams-1/1/0  ss1                                                     0
mams-5/0/0  napt_set                                               18
mams-5/0/0  ss1                                                     0
mams-5/1/0  napt_set                                               34
mams-5/1/0  ss1                                                     0
```

## show services nat mappings app

**Syntax** **show services nat mappings app**
*<pool-name>*

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Display the Network Address Translation (NAT) mappings for paired IP address pooling (or address pooling paired [APP]) for the NAT pools on the multiservices interface.

**Options** ***pool-name***—(Optional) Display the NAT mappings for the NAT pool specified. (The NAT pools are configured at the **[edit services nat]** hierarchy level.)

**Required Privilege Level** view

**Related Documentation**
- show services nat mappings eim on page 1344
- show services nat mappings summary on page 1346

**List of Sample Output** show services nat mappings app on page 1343

**Output Fields** Table 118 on page 1342 lists the output fields for the **show services nat mappings app** command. Output fields are listed in the approximate order in which they appear.

### Table 118: show services nat mappings app Output Fields

| Field Name | Field Description |
|---|---|
| **Interface** | Name of the multiservices interface (**ms-** or **mams-**). |
| **Service set** | Name of the service set for which the NAT mappings are displayed. |
| **NAT pool** | Name of the NAT pool. |
| **Internal Address** | Internal IP address that is being mapped. |
| **External Address** | External IP address to which the internal address is mapped. |
| **Number of sessions** | Number of sessions for which the NAT mapping has been done. |
| **State** | NAT mapping state. The following states are possible:<br>• **ACTIVE**—Indicates that the entry is active and in use.<br>• **TIMEOUT**—Indicates that the entry is not in use and will be deleted after the **mapping-timeout**, configured at the **[edit services nat pool *pool-name*]** hierarchy level, lapses. |

## Sample Output

**show services nat mappings app**

```
user@host> show services nat mappings app
Interface: ms-1/0/0, Service set: ss

NAT pool: p1
Internal Address    External Address     Number of sessions    State
10.10.10.3          30.30.30.3           1                     ACTIVE
10.10.10.2          30.30.30.2           2                     ACTIVE
```

## show services nat mappings eim

**Syntax** **show services nat mappings eim**
*<pool-name>*

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Display the Network Address Translation (NAT) mappings for Endpoint Independent Mapping (EIM) for the NAT pools on the multiservices interface.

**Options** ***pool-name***—(Optional) Display the NAT mappings for the NAT pool specified. (The NAT pools are configured at the **[edit services nat]** hierarchy level.)

**Required Privilege Level** view

**Related Documentation**
- show services nat mappings app on page 1342
- show services nat mappings summary on page 1346

**List of Sample Output** show services nat mappings eim on page 1345

**Output Fields** Table 119 on page 1344 lists the output fields for the **show services nat mappings eim** command. Output fields are listed in the approximate order in which they appear.

### Table 119: show services nat mappings eim Output Fields

| Field Name | Field Description |
|---|---|
| **Interface** | Name of the multiservices interface (**ms-** or **mams-**). |
| **Service set** | Name of the service set for which the NAT mappings are displayed. |
| **NAT pool** | Name of the NAT pool. |
| **Internal Address: Port** | Internal IP address and the port that are being mapped. |
| **External Address: Port** | External IP address and the port to which the internal address and port are mapped. |
| **Number of sessions** | Number of sessions for which the NAT mapping has been done. |
| **State** | NAT mapping state. The following states are possible:<br>• **ACTIVE**—Indicates that the entry is active and in use.<br>• **TIMEOUT**—Indicates that the entry is not in use and will be deleted after the **mapping-timeout**, configured at the **[edit services nat pool *pool-name*]** hierarchy level, lapses. |

## Sample Output

**show services nat mappings eim**

```
user@host> show services nat mappings eim
Interface: ms-1/0/0, Service set: ss

NAT pool: p1
Internal Address    External Address     Number of sessions    State
10.10.10.3          30.30.30.3           1                     ACTIVE
10.10.10.2          30.30.30.2           2                     ACTIVE
```

## show services nat mappings summary

**Syntax** **show services nat mappings summary**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Display the summary information about the Network Address Translation (NAT) mappings for the active multiservices interfaces.

**Required Privilege Level** view

**Related Documentation**
- show services nat mappings app on page 1342
- show services nat mappings eim on page 1344

**List of Sample Output** show services nat mappings summary on page 1346

**Output Fields** Table 120 on page 1346 lists the output fields for the **show services nat mappings summary** command. Output fields are listed in the approximate order in which they appear.

### Table 120: show services nat mappings summary Output Fields

| Field Name | Field Description |
|---|---|
| **Interface** | Name of the multiservices interface (**ms-** or **mams-**). |
| **Total number of address mappings** | Total number of address pooling paired (APP) mappings. |
| **Total number of endpoint independent port mappings** | Total number of endpoint-independent port mappings. |

## Sample Output

**show services nat mappings summary**

```
user@host> show services nat mappings summary

Interface Name:                                          ms-1/0/0
Total number of address mappings:                        1
Total number of endpoint independent port mappings:      2
```

## show services nat pool (Aggregated Multiservices)

**Syntax** **show services nat pool**
**<brief | detail>**
***<pool-name>***

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Display information about the Network Address Translation (NAT) pools and their current split among the active aggregated multiservices (AMS) member interfaces. In AMS NAT, the pool might be split among the active members based on the NAT type configured.

**Options** **none**—Display standard information about all the NAT pools for the **ams** interface.

**brief | detail**—(Optional) Display the specified level of output.

***pool-name***—(Optional) Display information about the specified NAT pool.

**Required Privilege Level** view

**List of Sample Output**
show services nat pool brief (Aggregated Multiservices) on page 1348
show services nat pool detail (Aggregated Multiservices) on page 1348
show services nat pool dynamic_pool detail on page 1349

**Output Fields** Table 121 on page 1347 lists the output fields for the **show services nat pool** (aggregated multiservices) command. Output fields are listed in the approximate order in which they appear.

### Table 121: show services nat pool Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Interface** | Name of the aggregated multiservices member interface (**mams-**) and the aggregated multiservices interface (**ams**) to which it belongs. | All levels |
| **Service set** | Name of the service set for the interface. Individual empty service sets are not displayed, but if none of the service sets has any flows, a flow table header is printed for each service set. | All levels |
| **NAT pool** | Name of the NAT pool for the interface. | All levels |
| **Type** or **Translation type** | Address translation type: **basic-nat-pt**, **basic-nat44**, **dnat-44**, **dynamic-nat44**, **NAPT-44**, or **napt-pt**. | All levels |
| **Address** or **Address range** | IPv4 address range of the pool. | All levels |
| **Port** or **Port range** | Port range of the pool. This is applicable only for dynamic NAT pools and is not displayed for static NAT pools. | All levels |

Table 121: show services nat pool Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Ports used** or **Ports in use** | Number of ports allocated in this pool with this name. This is applicable only for dynamic NAT pools and is not displayed for static NAT pools. | All levels |
| **Out of port errors** | Number of port allocation errors. This is applicable only for dynamic NAT pools and is not displayed for static NAT pools. | **detail** |
| **Max ports used** | Maximum number of ports used. This is applicable only for dynamic NAT pools and is not displayed for static NAT pools. | **detail** |
| **Addresses in use** | Number of addresses in use for dynamic source address NAT pools. | **detail** |

## Sample Output

**show services nat pool brief (Aggregated Multiservices)**

```
user@host> show services nat pool brief
Interface: mams-1/0/0 (ams0), Service set: napt_set
NAT pool          Type    Address                          Port        Ports used
napt_pool         NAPT-44 30.30.30.160-30.30.30.163        6000-8000   1
                          30.30.30.176-30.30.30.176
Interface: mams-1/1/0 (ams0), Service set: napt_set
NAT pool          Type    Address                          Port        Ports used
napt_pool         NAPT-44 30.30.30.164-30.30.30.167        6000-8000   0
Interface: mams-5/0/0 (ams0), Service set: napt_set
NAT pool          Type    Address                          Port        Ports used
napt_pool         NAPT-44 30.30.30.168-30.30.30.171        6000-8000   0
Interface: mams-5/1/0 (ams0), Service set: napt_set
NAT pool          Type    Address                          Port        Ports used
napt_pool         NAPT-44 30.30.30.172-30.30.30.175        6000-8000   0
```

**show services nat pool detail (Aggregated Multiservices)**

```
user@host> show services nat pool detail

Interface: mams-1/0/0 (ams0), Service set: napt_set
  NAT pool: napt_pool, Translation type: NAPT-44
    Address range: 30.30.30.160-30.30.30.163
    Address range: 30.30.30.176-30.30.30.176
    Port range: 6000-8000, Ports in use: 19, Out of port errors: 0, Max ports
used: 19

Interface: mams-1/1/0 (ams0), Service set: napt_set
  NAT pool: napt_pool, Translation type: NAPT-44
    Address range: 30.30.30.164-30.30.30.167
    Port range: 6000-8000, Ports in use: 18, Out of port errors: 0, Max ports
used: 18

Interface: mams-5/0/0 (ams0), Service set: napt_set
  NAT pool: napt_pool, Translation type: NAPT-44
    Address range: 30.30.30.168-30.30.30.171
   Port range: 6000-8000, Ports in use: 9, Out of port errors: 0, Max ports used:
 9

Interface: mams-5/1/0 (ams0), Service set: napt_set
  NAT pool: napt_pool, Translation type: NAPT-44
    Address range: 30.30.30.172-30.30.30.175
    Port range: 6000-8000, Ports in use: 17, Out of port errors: 0, Max ports
```

```
used: 17
```

**show services nat pool dynamic_pool detail**

```
user@host> show services nat pool dynamic_pool detail
Interface: mams-1/0/0 (ams0), Service set: napt_set
  NAT pool: napt_pool, Translation type: NAPT-44
    Address range: 30.30.30.160-30.30.30.163
    Address range: 30.30.30.176-30.30.30.176
    Port range: 6000-8000, Ports in use: 19, Out of port errors: 0, Max ports
used: 19

Interface: mams-1/1/0 (ams0), Service set: napt_set
  NAT pool: napt_pool, Translation type: NAPT-44
    Address range: 30.30.30.164-30.30.30.167
    Port range: 6000-8000, Ports in use: 18, Out of port errors: 0, Max ports
used: 18

Interface: mams-5/0/0 (ams0), Service set: napt_set
  NAT pool: napt_pool, Translation type: NAPT-44
    Address range: 30.30.30.168-30.30.30.171
   Port range: 6000-8000, Ports in use: 9, Out of port errors: 0, Max ports used:
 9

Interface: mams-5/1/0 (ams0), Service set: napt_set
  NAT pool: napt_pool, Translation type: NAPT-44
    Address range: 30.30.30.172-30.30.30.175
    Port range: 6000-8000, Ports in use: 17, Out of port errors: 0, Max ports
used: 17
```

## show services nat statistics

**Syntax** **show services nat statistics**
**<interface *interface*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Display the NAT statistics for the multiservices interfaces present on the broadband gateway.

**Options** **interface *interface***—Name of the extension provider interface.

**Required Privilege Level** view

**List of Sample Output** show services nat statistics on page 1355

**Output Fields** Table 122 on page 1350 lists the output fields for the **show services nat statistics** command. Output fields are listed in the approximate order in which they appear. Some of these fields are used internally by Juniper's engineers for troubleshooting.

### Table 122: show services nat statistics Output Fields

| Field Name | Field Description |
|---|---|
| **Interface** | Name of the multiservices interface. |
| Session Statistics | |
| **Total Session Interest events** | Total number of Session Interest events. |
| **Total Session Create events** | Total number of Session Create events. |
| **Total Session Destroy events** | Total number of Session Destroy events. |
| **Total Session Pub Req events** | Total number of Session Pub Req events. |
| **Total Session Accepts** | Total number of sessions accepted. |
| **Total Session Discards** | Total number of sessions discarded. |
| **Total Session Ignores** | Total number of sessions ignored. |
| **Session interest thru pub event** | Session interest through pub event. |

Table 122: show services nat statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **ALG Session interest** | Application-level gateway (ALG) session interest. |
| **ALG Session Create** | ALG Session Create |
| **Packet Dst in NAT route** | Sessions discarded due to packet destination in the NAT route. |
| **Session Ext Alloc Failures** | Session extension allocation failures. |
| **Session Ext Set Failures** | Session extension set failures. |
| **Session Created for EIF** | Number of sessions created for Endpoint Independent Filtering (EIF). |
| **Session Created for EIM** | Number of sessions created for Endpoint Independent Mapping (EIM). |
| **NAT rule lookup failures** | Number of NAT rule lookup failures. |
| NAT Allocation Statistics | |
| **NAT allocation Successes** | Number of successful NAT map allocations. |
| **NAT allocation Failures** | Number of NAT map allocation failures. |
| **NAT Free Successes** | NAT free successes. |
| **NAT Free Failures** | NAT free failures. |
| **NAT EIM mapping reused** | Number of NAT EIM mappings reused. |
| **NAT EIM mapping allocation failures** | Number of NAT EIM mapping allocation failures. |
| **NAT EIM mapping Duplicate entry** | Number of duplicate NAT EIM mappings. |
| **NAT EIM mapping create failed** | Number of failed NAT EIM mappings. |
| **NAT EIM mapping Created** | Number of NAT EIM mappings created. |

Table 122: show services nat statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **NAT EIF mapping Free** | Number of free NAT EIF mappings. |
| **NAT EIM mapping Free** | Number of free NAT EIM mappings. |
| **NAT EIM waiting for init** | Number of NAT EIM mappings waiting for initialization. |
| **NAT EIM waiting for init failed** | Number of NAT EIM mappings that failed initialization. |
| **NAT EIM lookup and hold success** | Number of successful NAT EIM lookups and holds. |
| **NAT EIM lookup entry in timeout** | NAT EIM lookup entry in timeout. |
| **NAT EIM lookup timer cleared for timeout entry** | NAT EIM lookup timer cleared for timeout entry. |
| **NAT EIM lookup timeout entry without timer** | NAT EIM lookup timeout entry without timer. |
| **NAT EIM release without entry** | NAT EIM release without entry. |
| **NAT EIM release entry in timeout** | NAT EIM release entry in timeout. |
| **NAT EIM release race** | NAT EIM release race. |
| **NAT EIM release set entry for timeout** | NAT EIM release set entry for timeout. |
| **NAT EIM timer entry refreshed** | NAT EIM timer entry refreshed. |
| **NAT EIM timer invalid timer started** | NAT EIM timer invalid timer started. |
| **NAT EIM timer entry freed** | NAT EIM timer entry freed. |
| Packet Statistics | |

Table 122: show services nat statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Total Packets Processed** | Total number of packets processed. |
| **Total Packets Forwarded** | Total number of packets forwarded. |
| **Total Packets Discarded** | Total number of packets discarded. |
| **Total Packets Translated** | Total number of packets translated. |
| **Total Packets Restored** | Total number of packets restored. |
| Translation Statistics | |
| **Src IPv4 Translations** | Number of source IPv4 translations. |
| **Src IPv4 Restorations** | Number of source IPv4 restorations. |
| **Dst IPv4 Translations** | Number of destination IPv4 translations. |
| **Dst IPv4 Restorations** | Number of destination IPv4 restorations. |
| **Src Port Translations** | Number of source port translations. |
| **Src Port Restorations** | Number of source port restorations. |
| **Dst Port Translations** | Number of destination port translations. |
| **Dst Port Restorations** | Number of destination port restorations. |
| **ICMP ID Translations** | Number of Internet Control Message Protocol (ICMP) translations. |
| **ICMP ID Restorations** | Number of ICMP restorations. |
| **ICMP Error Translations** | Number of ICMP error packets after translations. |

Table 122: show services nat statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **TCP Port Translations** | Number of TCP port translations. |
| **TCP Port Restorations** | Number of TCP port restorations. |
| **UDP Port Translations** | Number of UDP port translations. |
| **UDP Port Restorations** | Number of UDP port restorations. |
| **GRE Call ID Translations** | Number of generic routing encapsulation (GRE) call ID translations. |
| **GRE Call ID Restorations** | Number of GRE call ID restorations. |
| **SRC IP restored in ICMP Error** | Source IP restored in ICMP Error. |
| **DST IP restored in ICMP Error** | DST IP restored in ICMP Error. |
| **SRC IP translated in ICMP Error** | SRC IP translated in ICMP Error. |
| **DST IP translated in ICMP Error** | Destination IP translated in ICMP Error. |
| **New SRC IP translated in ICMP Error** | New source IP translated in ICMP Error. |
| **Inner SRC IP restored in ICMP Error** | Inner source IP restored in ICMP Error. |
| **Inner SRC port restored in ICMP Error** | Inner source port restored in ICMP Error. |
| **Inner DST IP restored in ICMP Error** | Inner destination IP restored in ICMP Error. |
| **Inner SRC IP Translated in ICMP Error** | Inner source IP translated in ICMP Error. |

Table 122: show services nat statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Inner SRC port Translated in ICMP Error** | Inner source port translated in ICMP Error. |
| **Inner DST IP Translated in ICMP Error** | Inner destination IP translated in ICMP Error. |
| Misc Errors | |
| **NAT error - no policy** | Number of NAT errors of the **no policy** type. |
| **NAT error - xlate free called with null ext** | Number of NAT errors of the **xlate free called with null ext** type. |
| **NAT error - ext free failed** | Number of NAT errors of the **ext free failed** type. |
| **NAT error - policy add failed** | Number of NAT errors of the **policy add failed** type. |
| **NAT error - policy delete failed** | Number of NAT errors of the **policy delete failed** type. |

## Sample Output

**show services nat statistics**

```
user@host> show services nat statistics
Interface: ms-0/0/0

Session statistics
    Total Session Interest events                    :12315
    Total Session Create events                      :2
    Total Session Destroy events                     :12315
    Total Session Pub Req events                     :0
    Total Session Accepts                            :12315
    Total Session Discards                           :0
    Total Session Ignores                            :0
    Session interest thru pub event                  :0
    ALG Session interest                             :0
    ALG Session Create                               :0
    Packet  Dst in NAT route                         :0
    Session Ext Alloc Failures                       :0
    Session Ext Set Failures                         :0
    Session Created for EIF                          :1
    Session Created for EIM                          :12314
    NAT rule lookup failures                         :0

NAT Allocation statistics
    NAT allocation Successes                         :12314
    NAT allocation Failures                          :0
    NAT Free Successes                               :0
```

```
    NAT Free Failures                                    :0
    NAT EIM mapping reused                               :12312
    NAT EIM mapping allocation failures                  :0
    NAT EIM mapping Duplicate entry                      :0
    NAT EIM mapping create failed                        :0
    NAT EIM mapping Created                              :2
    NAT EIF mapping Free                                 :1
    NAT EIM mapping Free                                 :12314
    NAT EIM waiting for init                             :0
    NAT EIM waiting for init failed                      :0
    NAT EIM lookup and hold success                      :12313
    NAT EIM lookup entry in timeout                      :0
    NAT EIM lookup timer cleared for timeout entry       :0
    NAT EIM lookup timeout entry without timer           :0
    NAT EIM release without entry                        :0
    NAT EIM release entry in timeout                     :0
    NAT EIM release race                                 :0
    NAT EIM release set entry for timeout                :2
    NAT EIM timer entry refreshed                        :0
    NAT EIM timer invalid timer started                  :2
    NAT EIM timer entry freed                            :2

Packet statistics
    Total Packets Processed                              :2715735062
    Total Packets Forwarded                              :2715735062
    Total Packets Discarded                              :0
    Total Packets Translated                             :1818000836
    Total Packets Restored                               :897734226

Translation statistics
    Src  IPv4   Translations                             :400996
    Src  IPv4   Restorations                             :897734226
    Dst  IPv4   Translations                             :1817599840
    Dst  IPv4   Restorations                             :0
    Src  Port   Translations                             :400996
    Src  Port   Restorations                             :897734226
    Dst  Port   Translations                             :1817599840
    Dst  Port   Restorations                             :0
    ICMP ID     Translations                             :0
    ICMP ID     Restorations                             :0
    ICMP Error  Translations                             :0
    TCP  Port   Translations                             :0
    TCP  Port   Restorations                             :0
    UDP  Port   Translations                             :1818000836
    UDP  Port   Restorations                             :897734226
    GRE  CallID Translations                             :0
    GRE  CallID Restorations                             :0
    SRC IP restored in ICMP Error                        :0
    DST IP restored in ICMP Error                        :0
    SRC IP translated in ICMP Error                      :0
    DST IP translated in ICMP Error                      :0
    New SRC IP translated in ICMP Error                  :0
    Inner SRC IP restored in ICMP Error                  :0
    Inner SRC port restored in ICMP Error                :0
    Inner DST IP restored in ICMP Error                  :0
    Inner SRC IP Translated in ICMP Error                :0
    Inner SRC port Translated in ICMP Error              :0
    Inner DST IP Translated in ICMP Error                :0

Misc Errors
    NAT error - no policy                                :0
```

```
    NAT error - xlate free called with null ext             :0
    NAT error - ext free failed                             :0
    NAT error - policy add failed                           :0
    NAT error - policy delete failed                        :0

Interface: ms-1/1/0

Session statistics
    Total Session Interest events                           :6
    Total Session Create events                             :6
    Total Session Destroy events                            :7
    Total Session Pub Req events                            :0
    Total Session Accepts                                   :6
    Total Session Discards                                  :0
    Total Session Ignores                                   :0
    Session interest thru pub event                         :0
    ALG Session interest                                    :0
    ALG Session Create                                      :0
    Packet  Dst in NAT route                                :0
    Session Ext Alloc Failures                              :0
    Session Ext Set Failures                                :0
    Session Created for EIF                                 :0
    Session Created for EIM                                 :6
    NAT rule lookup failures                                :0

NAT Allocation statistics
    NAT allocation Successes                                :6
    NAT allocation Failures                                 :0
    NAT Free Successes                                      :0
    NAT Free Failures                                       :0
    NAT EIM mapping reused                                  :3
    NAT EIM mapping allocation failures                     :0
    NAT EIM mapping Duplicate entry                         :0
    NAT EIM mapping create failed                           :0
    NAT EIM mapping Created                                 :3
    NAT EIF mapping Free                                    :0
    NAT EIM mapping Free                                    :7
    NAT EIM waiting for init                                :0
    NAT EIM waiting for init failed                         :0
    NAT EIM lookup and hold success                         :2
    NAT EIM lookup entry in timeout                         :1
    NAT EIM lookup timer cleared for timeout entry          :1
    NAT EIM lookup timeout entry without timer              :0
    NAT EIM release without entry                           :0
    NAT EIM release entry in timeout                        :0
    NAT EIM release race                                    :0
    NAT EIM release set entry for timeout                   :5
    NAT EIM timer entry refreshed                           :0
    NAT EIM timer invalid timer started                     :4
    NAT EIM timer entry freed                               :4

Packet statistics
    Total Packets Processed                                 :2733886586
    Total Packets Forwarded                                 :2733886586
    Total Packets Discarded                                 :0
    Total Packets Translated                                :1836152360
    Total Packets Restored                                  :897734226

Translation statistics
    Src  IPv4   Translations                                :1836152360
    Src  IPv4   Restorations                                :0
```

```
    Dst  IPv4   Translations                          :0
    Dst  IPv4   Restorations                         :897734226
    Src  Port   Translations                         :1836152360
    Src  Port   Restorations                         :0
    Dst  Port   Translations                         :0
    Dst  Port   Restorations                         :897734226
    ICMP ID     Translations                         :0
    ICMP ID     Restorations                         :0
    ICMP Error  Translations                         :0
    TCP  Port   Translations                         :0
    TCP  Port   Restorations                         :0
    UDP  Port   Translations                         :1836152360
    UDP  Port   Restorations                         :897734226
    GRE  CallID Translations                         :0
    GRE  CallID Restorations                         :0
    SRC IP restored in ICMP Error                    :0
    DST IP restored in ICMP Error                    :0
    SRC IP translated in ICMP Error                  :0
    DST IP translated in ICMP Error                  :0
    New SRC IP translated in ICMP Error              :0
    Inner SRC IP restored in ICMP Error              :0
    Inner SRC port restored in ICMP Error            :0
    Inner DST IP restored in ICMP Error              :0
    Inner SRC IP Translated in ICMP Error            :0
    Inner SRC port Translated in ICMP Error          :0
    Inner DST IP Translated in ICMP Error            :0

Misc Errors
    NAT error - no policy                            :0
    NAT error - xlate free called with null ext      :0
    NAT error - ext free failed                      :0
    NAT error - policy add failed                    :0
    NAT error - policy delete failed                 :0
```

## show services service-sets summary

**Syntax** **show services service-sets summary**
**<interface *interface*>**

**Release Information** Command introduced before Junos OS Release 7.4.
Display of the CPU usage in the output introduced in Junos OS Mobility Release 11.2W.

**Description** Display the summary information about the service sets for multiservices (MS) interfaces.

**Options** **interface *interface***—Name of the adaptive services interface (**ms-**).

**Required Privilege Level** view

**List of Sample Output** show services service-sets summary on page 1359

**Output Fields** Table 123 on page 1359 lists the output fields for the **show services service-sets summary** command. Output fields are listed in the approximate order in which they appear.

### Table 123: show services service-sets summary Output Fields

| Field Name | Field Description |
|---|---|
| **Interface** | Name of the multiservices member interface (**ms-**). |
| **Service sets configured** | Total number of service sets configured on the interface. |
| **Bytes used** | Total number of bytes used by stateful services for runtime information. (The **object-cache-size** statement is used to set the memory allocated for runtime services.) The following information is also displayed:<br>• Memory Alarm (zone): If the amount of free memory goes below the limit (64 MB for 32-bit Junos OS and 128 MB for 64-bit Junos OS), an overload alert (**OVLD**) is displayed. If not, then nothing is displayed.<br>• Percentage of the total number of bytes used. |
| **Policy bytes used** | Total number of policy bytes used and the percentage used. Policy bytes is the amount of memory used for user configuration and correlates with the **policy-db-size** statement. |
| **CPU Utilization** | Percentage of CPU utilization per PIC. The following information is also displayed:<br>• CPU Alarm (Zone): If the CPU utilization goes above the configured limit, then an overload alert (**OVLD**) is displayed. If not, then nothing is displayed. |

## Sample Output

**show services service-sets summary**

```
user@host> show services service-sets summary
                    Service sets
                    CPU
Interface    configured            Bytes used   Policy bytes used  utilization
```

```
ms-0/0/0            1    385021900      (81.96%)     299796 ( 0.44%)  92.89 % OVLD
```

## show services sessions (Aggregated Multiservices)

**Syntax**

**show services sessions**
<**brief | extensive | terse**>
<**application-protocol** *protocol*>
<**count**>
<**destination-port** *destination-port*>
<**destination-prefix** *destination-prefix*>
<**interface** *interface-name*>
<**limit** *number*>
<**protocol** *protocol*>
<**service-set** *service-set*>
<**source-port** *source-port*>
<**source-prefix** *source-prefix*>

**Release Information**

Command introduced in Junos OS Mobility Release 10.4.
Support for aggregated multiservices (AMS) introduced in Junos OS Mobility Release 11.2W.

**Description**

Display the session information for each service set in each member interface of the AMS interface.

**Options**

**none**—Display standard information about all sessions.

**brief | extensive | terse**—(Optional) Display the specified level of output.

**application-protocol**—(Optional) Display information about one of the following application protocols:

- **ftp**—File Transfer Protocol
- **icmp**—Internet Control Message Protocol
- **pptp**—Point-to-Point Tunneling Protocol
- **rtsp**—Real-Time Streaming Protocol
- **sqlnet**—SQL *Net
- **tcp**—Transmission Control Protocol
- **traceroute**—Traceroute
- **tftp**—Trivial File Transfer Protocol
- **udp**—User Datagram Protocol

**count**—(Optional) Display a count of the matching entries.

**destination-port** ***destination-port***—(Optional) Display information for a particular destination port. The range of values is from 0 through 65,535.

**destination-prefix** ***destination-prefix***—(Optional) Display information for a particular destination prefix.

**interface** ***interface-name***—(Optional) Display information about a particular interface. On M Series and T Series routers, ***interface-name*** can be **ms-***fpc/pic/port* or **rsp***number*. On J Series routers, ***interface-name*** is **ms-***pim/0/port*.

**limit** ***number***—(Optional) Maximum number of entries to display.

**protocol** ***protocol***—(Optional) Display information about one of the following IP types:

- ***number***—Numeric protocol value from 0 through 255
- **ah**—IPsec Authentication Header protocol
- **egp**—An exterior gateway protocol
- **esp**—IPsec Encapsulating Security Payload protocol
- **gre**—A generic routing encapsulation protocol
- **icmp**—Internet Control Message Protocol
- **icmp6**—Internet Control Message Protocol version 6
- **igmp**—Internet Group Management Protocol
- **ipip**—IP-over-IP encapsulation protocol
- **ospf**—Open Shortest Path First protocol
- **pim**—Protocol Independent Multicast protocol
- **rsvp**—Resource Reservation Protocol
- **sctp**—Stream Control Transmission Protocol
- **tcp**—Transmission Control Protocol
- **udp**—User Datagram Protocol

**service-set** ***service-set***—(Optional) Display information for a particular service set.

**source-port** ***source-port***—(Optional) Display information for a particular source port. The range of values is from 0 through 65,535.

**source-prefix** ***source-prefix***—(Optional) Display information for a particular source prefix.

**Required Privilege Level** view

**List of Sample Output**

show services sessions brief on page 1363
show services sessions interface mams-5/0/0 extensive on page 1364
show services sessions terse on page 1366
show services sessions count on page 1367

**Output Fields** Table 124 on page 1363 lists the output fields for the **show services sessions** command. Output fields are listed in the approximate order in which they appear.

### Table 124: show services sessions Output Fields

| Field Name | Field Description |
|---|---|
| **Interface** | Name of the member interface (**mams-**) and the aggregated multiservices interface (**ams**) to which it belongs. |
| **Session ID** | Session ID that uniquely identifies the session. |
| **ALG** | Name of the application. |
| Flags | Session flag for the ALG:<br>• **0x1**—Found an existing session.<br>• **0x2**—Reached session or flow limit.<br>• **0x3**—No memory available for new sessions.<br>• **0x4**—No free session ID available. |
| IP Action | Flag indicating whether IP action has been set for the session. |
| **Offload** | Flag indicating whether the session has been offloaded to the Packet Forwarding Engine. |
| **Asymmetric** | Flag indicating whether the session is unidirectional. |
| **Service set** | Name of a service set. Individual empty service sets are not displayed. |
| **Sessions Count** | Number of sessions. |
| **Flow or Flow Prot** | Protocol used for this session. |
| **Source** | Source prefix of the flow in the format ***source-prefix:port***. For ICMP flows, port information is not displayed. |
| **Dest** | Destination prefix of the flow. For ICMP flows, port information is not displayed. |
| **State** | Status of the flow:<br>• **Drop**—Drop all packets in the flow without response.<br>• **Forward**—Forward the packet in the flow without looking at it.<br>• **Reject**—Drop all packets in the flow with response.<br>• **Watch**—Inspect packets in the flow.<br>• **Bypass**—Bypass packets in the flow.<br>• **Unknown**—Unknown flow status. |
| **Packet Direction** | Direction of the flow: ingress **(I)**, egress **(O)**, or unknown. |
| **Frm count** | Number of frames in the flow. |

## Sample Output

**show services sessions brief**

```
user@host> show services sessions brief
```

```
mams-1/0/0 (ams0)
Service Set: napt_set, Session: 16777217, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
UDP         30.30.30.2:63    ->     40.40.40.2:63    Forward  I           85689
UDP         40.40.40.2:63    ->   30.30.30.160:6000  Forward  O               0
```

**show services sessions interface mams-5/0/0 extensive**

```
user@host> show services sessions interface mams-5/0/0 extensive
mams-1/0/0 (ams0)
Service Set: napt_set, Session: 16777235, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
NAT PLugin Data:
  NAT Action:   Translation Type - NAPT-44
    NAT source     30.30.30.62:63      ->    30.30.30.176:6003
UDP        30.30.30.62:63    ->    40.40.40.62:63    Forward  I            1805
  Byte count: 83030
  Flow role: Initiator, Timeout: 0
UDP        40.40.40.62:63    ->   30.30.30.176:6003  Forward  O               0
  Byte count: 0
  Flow role: Responder, Timeout: 0
Service Set: napt_set, Session: 16777234, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no

NAT PLugin Data:
  NAT Action:   Translation Type - NAPT-44
    NAT source     30.30.30.57:63      ->    30.30.30.163:6003
UDP        30.30.30.57:63    ->    40.40.40.57:63    Forward  I            1805
  Byte count: 83030
  Flow role: Initiator, Timeout: 0
UDP        40.40.40.57:63    ->   30.30.30.163:6003  Forward  O               0
  Byte count: 0
  Flow role: Responder, Timeout: 0

[...output truncated...]
mams-1/1/0 (ams0)
Service Set: napt_set, Session: 16777234, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no

NAT PLugin Data:
  NAT Action:   Translation Type - NAPT-44
    NAT source     30.30.30.63:63      ->    30.30.30.165:6004
UDP        30.30.30.63:63    ->    40.40.40.63:63    Forward  I            1805
  Byte count: 83030
  Flow role: Initiator, Timeout: 0
UDP        40.40.40.63:63    ->   30.30.30.165:6004  Forward  O               0
  Byte count: 0
  Flow role: Responder, Timeout: 0
Service Set: napt_set, Session: 16777233, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no

NAT PLugin Data:
  NAT Action:   Translation Type - NAPT-44
    NAT source     30.30.30.60:63      ->    30.30.30.164:6004
UDP        30.30.30.60:63    ->    40.40.40.60:63    Forward  I            1805
  Byte count: 83030
  Flow role: Initiator, Timeout: 0
UDP        40.40.40.60:63    ->   30.30.30.164:6004  Forward  O               0
  Byte count: 0
  Flow role: Responder, Timeout: 0
Service Set: napt_set, Session: 16777232, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
```

```
[...output truncated...]
mams-5/0/0 (ams0)
Service Set: napt_set, Session: 16777225, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no

NAT PLugin Data:
  NAT Action:   Translation Type - NAPT-44
    NAT source     30.30.30.64:63      ->    30.30.30.168:6002
UDP        30.30.30.64:63    ->    40.40.40.64:63    Forward  I            1805
  Byte count: 83030
  Flow role: Initiator, Timeout: 0
UDP        40.40.40.64:63    ->   30.30.30.168:6002  Forward  O               0
  Byte count: 0
  Flow role: Responder, Timeout: 0
Service Set: napt_set, Session: 16777224, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no

NAT PLugin Data:
  NAT Action:   Translation Type - NAPT-44
    NAT source     30.30.30.56:63      ->    30.30.30.171:6001
UDP        30.30.30.56:63    ->    40.40.40.56:63    Forward  I            1805
  Byte count: 83030
  Flow role: Initiator, Timeout: 0
UDP        40.40.40.56:63    ->   30.30.30.171:6001  Forward  O               0
  Byte count: 0
  Flow role: Responder, Timeout: 0
Service Set: napt_set, Session: 16777223, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no

[...output truncated...]
mams-5/1/0 (ams0)
Service Set: napt_set, Session: 16777233, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no

NAT PLugin Data:
  NAT Action:   Translation Type - NAPT-44
    NAT source     30.30.30.61:63      ->    30.30.30.172:6004
UDP        30.30.30.61:63    ->    40.40.40.61:63    Forward  I            1805
  Byte count: 83030
  Flow role: Initiator, Timeout: 0
UDP        40.40.40.61:63    ->   30.30.30.172:6004  Forward  O               0
  Byte count: 0
  Flow role: Responder, Timeout: 0
Service Set: napt_set, Session: 16777232, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no

NAT PLugin Data:
  NAT Action:   Translation Type - NAPT-44
    NAT source     30.30.30.52:63      ->    30.30.30.175:6003
UDP        30.30.30.52:63    ->    40.40.40.52:63    Forward  I            1805
  Byte count: 83030
  Flow role: Initiator, Timeout: 0
UDP        40.40.40.52:63    ->   30.30.30.175:6003  Forward  O               0
  Byte count: 0
  Flow role: Responder, Timeout: 0
Service Set: napt_set, Session: 16777231, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no

[...output truncated...]
```

**show services sessions terse**

```
user@router> show services sessions terse
mams-1/0/0 (ams0)
Service Set: napt_set, Session: 16777235, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
UDP        30.30.30.62:63    ->    40.40.40.62:63    Forward  I            2541
UDP        40.40.40.62:63    ->   30.30.30.176:6003  Forward  O               0
Service Set: napt_set, Session: 16777234, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
UDP        30.30.30.57:63    ->    40.40.40.57:63    Forward  I            2541
UDP        40.40.40.57:63    ->   30.30.30.163:6003  Forward  O               0
Service Set: napt_set, Session: 16777233, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
UDP        30.30.30.50:63    ->    40.40.40.50:63    Forward  I            2541
UDP        40.40.40.50:63    ->   30.30.30.162:6003  Forward  O               0
Service Set: napt_set, Session: 16777232, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
UDP        30.30.30.48:63    ->    40.40.40.48:63    Forward  I            2541
UDP        40.40.40.48:63    ->   30.30.30.161:6003  Forward  O               0
[...output truncated...]
mams-1/1/0 (ams0)
Service Set: napt_set, Session: 16777234, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
UDP        30.30.30.63:63    ->    40.40.40.63:63    Forward  I            2543
UDP        40.40.40.63:63    ->   30.30.30.165:6004  Forward  O               0
Service Set: napt_set, Session: 16777233, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
UDP        30.30.30.60:63    ->    40.40.40.60:63    Forward  I            2543
UDP        40.40.40.60:63    ->   30.30.30.164:6004  Forward  O               0
Service Set: napt_set, Session: 16777232, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
UDP        30.30.30.59:63    ->    40.40.40.59:63    Forward  I            2543
UDP        40.40.40.59:63    ->   30.30.30.167:6003  Forward  O               0
Service Set: napt_set, Session: 16777231, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
UDP        30.30.30.58:63    ->    40.40.40.58:63    Forward  I            2543
UDP        40.40.40.58:63    ->   30.30.30.166:6003  Forward  O               0
[...output truncated...]
mams-5/0/0 (ams0)
Service Set: napt_set, Session: 16777225, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
UDP        30.30.30.64:63    ->    40.40.40.64:63    Forward  I            2543
UDP        40.40.40.64:63    ->   30.30.30.168:6002  Forward  O               0
Service Set: napt_set, Session: 16777224, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
UDP        30.30.30.56:63    ->    40.40.40.56:63    Forward  I            2543
UDP        40.40.40.56:63    ->   30.30.30.171:6001  Forward  O               0
Service Set: napt_set, Session: 16777223, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
UDP        30.30.30.55:63    ->    40.40.40.55:63    Forward  I            2543
UDP        40.40.40.55:63    ->   30.30.30.170:6001  Forward  O               0
Service Set: napt_set, Session: 16777222, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
UDP        30.30.30.51:63    ->    40.40.40.51:63    Forward  I            2543
UDP        40.40.40.51:63    ->   30.30.30.169:6001  Forward  O               0
[...output truncated...]
mams-5/1/0 (ams0)
Service Set: napt_set, Session: 16777233, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
UDP        30.30.30.61:63    ->    40.40.40.61:63    Forward  I            2544
UDP        40.40.40.61:63    ->   30.30.30.172:6004  Forward  O               0
Service Set: napt_set, Session: 16777232, ALG: none, Flags: 0x2000, IP Action:
```

```
no, Offload: no, Asymmetric: no
UDP        30.30.30.52:63    ->    40.40.40.52:63    Forward  I            2545
UDP        40.40.40.52:63    ->   30.30.30.175:6003  Forward  O               0
Service Set: napt_set, Session: 16777231, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
UDP        30.30.30.47:63    ->    40.40.40.47:63    Forward  I            2545
UDP        40.40.40.47:63    ->   30.30.30.174:6003  Forward  O               0
Service Set: napt_set, Session: 16777230, ALG: none, Flags: 0x2000, IP Action:
no, Offload: no, Asymmetric: no
UDP        30.30.30.46:63    ->    40.40.40.46:63    Forward  I            2545
UDP        40.40.40.46:63    ->   30.30.30.173:6003  Forward  O               0
[...output truncated...]
```

**show services sessions count**

```
user@host> show services sessions count
Interface   Service set                                          Sessions count
mams-1/0/0  napt_set                                                       19
mams-1/0/0  ss1                                                             0
mams-1/1/0  napt_set                                                       18
mams-1/1/0  ss1                                                             0
mams-5/0/0  napt_set                                                        9
mams-5/0/0  ss1                                                             0
mams-5/1/0  napt_set                                                       17
mams-5/1/0  ss1                                                             0
```

CHAPTER 37

# Monitoring Operational Commands

## request unified-edge ggsn-pgw call-trace clear

**Syntax** **request unified-edge ggsn-pgw call-trace clear**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Clear the completed or duplicate subscriber call traces on one or more Gateway GPRS Support Nodes (GGSNs) or Packet Data Network Gateways (P-GWs).

**Options** This command has no options.

**Required Privilege Level** unified-edge

**Related Documentation**

- request unified-edge ggsn-pgw call-trace show on page 1371
- request unified-edge ggsn-pgw call-trace start on page 1374
- request unified-edge ggsn-pgw call-trace stop on page 1376

**List of Sample Output** request unified-edge ggsn-pgw call-trace on page 1370

**Output Fields** No message is displayed on successful execution of this command; otherwise an error message is displayed.

### Sample Output

**request unified-edge ggsn-pgw call-trace**

```
user@host> request unified-edge ggsn-pgw call-trace clear
```

## request unified-edge ggsn-pgw call-trace show

**Syntax**
request unified-edge ggsn-pgw call-trace show
<all | completed | current>
<brief | detail>

**Release Information**
Command introduced in Junos OS Mobility Release 11.2W.

**Description**
Display the information related to subscriber call tracing on one or more Gateway GPRS Support Nodes (GGSNs) or Packet Data Network Gateways (P-GWs).

**Options**
**none**—(Same as brief) Display the information related to subscriber call tracing in brief.

**all | completed | current**—(Optional)Display the call trace information for the following:

- **all**—All calls.
- **completed**—Completed calls only.
- **current**—Call traces that are currently active.

**brief | detail**—(Optional) Display the specified level of output.

**Required Privilege Level**
unified-edge

**Related Documentation**
- request unified-edge ggsn-pgw call-trace clear on page 1370
- request unified-edge ggsn-pgw call-trace start on page 1374
- request unified-edge ggsn-pgw call-trace stop on page 1376

**List of Sample Output**
request unified-edge ggsn-pgw call-trace show brief on page 1372
request unified-edge ggsn-pgw call-trace show detail on page 1372

**Output Fields**
Table 125 on page 1371 lists the output fields for the **request unified-edge ggsn-pgw call-trace show** command. Output fields are listed in the approximate order in which they appear.

### Table 125: request unified-edge ggsn-pgw call-trace show Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Identifier** | Identifier for the call trace. | All levels |
| **File name** or **Trace file** | Name of the call trace file. | All levels |
| **Status** | Status of the call trace:<br>• **done**—Call trace complete.<br>• **not-done**—Call trace in progress.<br>• **duplicate**—Another call trace record is present that has the same attributes. | All levels |

Table 125: request unified-edge ggsn-pgw call-trace show Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **SPIC Mask Create** or **Create Mask** | Internal mask of the services PIC where this call trace was enabled. | All levels |
| **SPIC Mask Complete** or **Complete Mask** | Internal mask of the services PIC where this call trace was completed. | All levels |
| **IMSI** | International Mobile Subscriber Identity (IMSI) of the subscriber's user equipment (UE). | |
| **MSISDN** | Mobile station ISDN (MSISDN) of the subscriber's user equipment. | |
| **Calls Traced** | Number of calls traced. | **detail** |
| **Next Call** | Number of next calls to be traced. For example, a value of 10 indicates that the next 10 calls are traced. | **detail** |
| **APN** | Access Point Name (APN) pertaining to the subscriber's call. | **detail** |
| **FPC** | FPC slot on which the call trace was enabled. This field is displayed only if the call trace is enabled on the FPC slot. | **detail** |
| **PIC** | PIC slot on which the call trace was enabled. This field is displayed only if the call trace is enabled on the PIC slot. | **detail** |

## Sample Output

**request unified-edge ggsn-pgw call-trace show brief**

```
user@host> request unified-edge ggsn-pgw call-trace show brief
  Identifier           File name           Status       SPIC Mask   SPIC Mask
                                                         create      complete
 call_trace_id_2 call_trace_id_2_02112012_060450        done 0x10   0x10
 call_trace_id_3 call_trace_id_3_02112012_070614        done 0x10   0x10
 call_trace_id_4 call_trace_id_4_02112012_071342   duplicate 0x0    0x0
 call_trace_id_5 call_trace_id_5_02112012_201317   duplicate 0x0    0x0
 call_trace_id_6 call_trace_id_6_02112012_201649   duplicate 0x0    0x0
 call_trace_id_7 call_trace_id_7_02112012_202501        done 0x0    0x0
 call_trace_id_8 call_trace_id_8_02112012_204718   duplicate 0x0    0x0
 call_trace_id_9 call_trace_id_9_02112012_204759    not-done 0x10   0x0
```

**request unified-edge ggsn-pgw call-trace show detail**

```
user@host> request unified-edge ggsn-pgw call-trace show detail
 Call trace information :

  Identifier : call_trace_id_13        Trace file :
call_trace_id_13_02292012_001343
  Status : not-done    Create Mask : 0x200      Complete Mask : 0x0
  IMSI : 29299
  Calls Traced : 0
  Identifier : call_trace_id_14        Trace file :
call_trace_id_14_02292012_001348
  Status : not-done    Create Mask : 0x200      Complete Mask : 0x0
                                                      MS-ISDN: 2929910000000000
```

```
  Calls Traced : 0
  Identifier : call_trace_id_15        Trace file :
call_trace_id_15_02292012_001408
  Status : not-done    Create Mask : 0x200      Complete Mask : 0x0
  Next Call : 1                        APN : jnpr-sunnyvale
  Calls Traced : 0
  Identifier : call_trace_id_16        Trace file :
call_trace_id_16_02292012_001416
  Status : not-done    Create Mask : 0x200      Complete Mask : 0x0
  Calls Traced : 0                     FPC : 3   PIC : 1
  Identifier : call_trace_id_17        Trace file :
call_trace_id_17_02292012_001424
  Status : done        Create Mask : 0x200      Complete Mask : 0x200
  Next Call : 2
  Calls Traced : 2
```

## request unified-edge ggsn-pgw call-trace start

**Syntax**

request unified-edge ggsn-pgw call-trace start
<apn-name *name*>
<fpc-slot *slot*>
<imsi *imsi*>
<msisdn *msisdn*>
<next-call *next-call*>
<pic-slot *slot*>

**Release Information**

Command introduced in Junos OS Mobility Release 11.2W.

**Description**

Start the subscriber call tracing on one or more Gateway GPRS Support Nodes (GGSNs) or Packet Data Network Gateways (P-GWs).

**Options**

**none**—Start the subscriber call tracing.

**apn-name *apn-name***—(Optional) Start the call tracing for subscribers accessing the specified access point name (APN).

**fpc-slot *slot***—(Optional) Start the call tracing for subscribers on the specified FPC slot.

**imsi *imsi***—(Optional) Start the call tracing for subscribers with the specified International Mobile Subscriber Identity (IMSI) number.

**msisdn *msisdn***—(Optional) Start the call tracing for subscribers with the specified Mobile station ISDN (MSIDSN) number.

**next-call *next-call***—(Optional) Start the call tracing for the specified number of next call events (1 through 50). For example, if you specify 10, then the next 10 calls will be traced.

**pic-slot *slot***—(Optional) Start the call tracing for subscribers on the specified PIC slot. You must specify an FPC slot before specifying a PIC slot number.

**Required Privilege Level**

unified-edge

**Related Documentation**

- request unified-edge ggsn-pgw call-trace clear on page 1370
- request unified-edge ggsn-pgw call-trace show on page 1371
- request unified-edge ggsn-pgw call-trace stop on page 1376

**List of Sample Output**

request unified-edge ggsn-pgw call-trace start fpc-slot 5 pic-slot 0 next-call 10 on page 1375

**Output Fields**

Table 126 on page 1375 lists the output fields for the **request unified-edge ggsn-pgw call-trace start** command. Output fields are listed in the approximate order in which they appear.

Table 126: request unified-edge ggsn-pgw call-trace start Output Fields

| Field Name | Field Description |
|---|---|
| **Session PIC** | Session PIC for which the call trace status is displayed. |
| **Status** | Status of the call trace:<br>• **duplicate**—Another call trace record is present that has the same attributes.<br>• **success**—Call trace started successfully.<br>• **fail**—Call tracing could not be started. |

## Sample Output

**request unified-edge ggsn-pgw call-trace start fpc-slot 5 pic-slot 0 next-call 10**

```
user@host> request unified-edge ggsn-pgw call-trace start fpc-slot 5 pic-slot 0 next-call 10
        Session PIC             Status
        ms-0/1/0                success
        ms-1/1/0                success
```

## request unified-edge ggsn-pgw call-trace stop

**Syntax** request unified-edge ggsn-pgw call-trace stop
<all>
<identifier *call-trace-identifier*>

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.

**Description** Stop the previously configured subscriber call tracing on one or more Gateway GPRS Support Nodes (GGSNs) or Packet Data Network Gateways (P-GWs).

**Options**

**none**—(Same as all) Stop all the subscriber call tracing options.

**all**—(Optional) Stop all the subscriber call tracing operations.

**identifier *identifier***—(Optional) Stop the call tracing for the specified call trace identifier.

**Required Privilege Level** unified-edge

**Related Documentation**

- request unified-edge ggsn-pgw call-trace clear on page 1370
- request unified-edge ggsn-pgw call-trace show on page 1371
- request unified-edge ggsn-pgw call-trace start on page 1374

**List of Sample Output** request unified-edge ggsn-pgw call-trace stop on page 1376

**Output Fields** Table 127 on page 1376 lists the output fields for the **request unified-edge ggsn-pgw call-trace stop** command. Output fields are listed in the approximate order in which they appear.

Table 127: request unified-edge ggsn-pgw call-trace stop Output Fields

| Field Name | Field Description |
|---|---|
| **Session PIC** | Session PIC for which the call trace status is displayed. |
| **Status** | Status of the call trace:<br>• **success**—Call trace stopped successfully.<br>• **fail**—Call tracing could not be stopped. |

### Sample Output

**request unified-edge ggsn-pgw call-trace stop**

```
user@host> request unified-edge ggsn-pgw call-trace stop
       Session PIC            Status
       ms-0/1/0             success
       ms-1/1/0             success
```

## request unified-edge sgw call-trace clear

**Syntax** **request unified-edge sgw call-trace clear**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Clear the completed or duplicate subscriber call traces on one or more Serving Gateways (S-GWs).

**Options** This command has no options.

**Required Privilege Level** unified-edge

**Related Documentation**

- request unified-edge sgw call-trace show on page 1378
- request unified-edge sgw call-trace start on page 1381
- request unified-edge sgw call-trace stop on page 1383

**List of Sample Output** request unified-edge sgw call-trace clear on page 1377

**Output Fields** No message is displayed on successful execution of this command; otherwise an error message is displayed.

### Sample Output

**request unified-edge sgw call-trace clear**

```
user@host> request unified-edge sgw call-trace clear
```

## request unified-edge sgw call-trace show

**Syntax**

request unified-edge sgw call-trace show
<all | completed | current>
<brief | detail>

**Release Information**

Command introduced in Junos OS Mobility Release 11.4W.

**Description**

Display the information related to subscriber call tracing on one or more Serving Gateways (S-GWs).

**Options**

**none**—(Same as brief) Display the information related to subscriber call tracing in brief.

**all | completed | current**—(Optional)Display the call trace information for the following:

- **all**—All calls.
- **completed**—Completed calls only.
- **current**—Call traces that are currently active.

**brief | detail**—(Optional) Display the specified level of output.

**Required Privilege Level**

unified-edge

**Related Documentation**

- request unified-edge sgw call-trace clear on page 1377
- request unified-edge sgw call-trace start on page 1381
- request unified-edge sgw call-trace stop on page 1383

**List of Sample Output**

request unified-edge sgw call-trace show brief on page 1379
request unified-edge sgw call-trace show detail on page 1379

**Output Fields**

Table 128 on page 1378 lists the output fields for the **request unified-edge sgw call-trace show** command. Output fields are listed in the approximate order in which they appear.

Table 128: request unified-edge sgw call-trace show Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Identifier** | Identifier for the call trace. | All levels |
| **File name** or **Trace file** | Name of the call trace file. | All levels |
| **Status** | Status of the call trace:<br>• **done**—Call trace complete.<br>• **not-done**—Call trace in progress.<br>• **duplicate**—Another call trace record is present that has the same attributes. | All levels |

Table 128: request unified-edge sgw call-trace show Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **SPIC Mask Create** or **Create Mask** | Internal mask of the services PIC where this call trace was enabled. | All levels |
| **SPIC Mask Complete** or **Complete Mask** | Internal mask of the services PIC where this call trace was completed. | All levels |
| **IMSI** | International Mobile Subscriber Identity (IMSI) of the subscriber's user equipment (UE). | |
| **MSISDN** | Mobile station ISDN (MSISDN) of the subscriber's user equipment. | |
| **Calls Traced** | Number of calls traced. | **detail** |
| **Next Call** | Number of next calls to be traced. For example, a value of 10 indicates that the next 10 calls are traced. | **detail** |
| **FPC** | FPC slot on which the call trace was enabled. This field is displayed only if the call trace is enabled on the FPC slot. | **detail** |
| **PIC** | PIC slot on which the call trace was enabled. This field is displayed only if the call trace is enabled on the PIC slot. | **detail** |

## Sample Output

**request unified-edge sgw call-trace show brief**

```
user@host> request unified-edge sgw call-trace show brief
  Identifier           File name           Status       SPIC Mask   SPIC Mask
                                                         create      complete
 call_trace_id_10 call_trace_id_10_02112012_205634       done 0x0  0x0
 call_trace_id_11 call_trace_id_11_02112012_205932       done 0x40 0x40
 call_trace_id_12 call_trace_id_12_02112012_210001    not-done 0x40 0x0
 call_trace_id_13 call_trace_id_13_02112012_210353   duplicate 0x0  0x0
```

**request unified-edge sgw call-trace show detail**

```
user@host> request unified-edge sgw call-trace show detail
 Call trace information :

  Identifier : call_trace_id_10        Trace file :
call_trace_id_10_02112012_205634
  Status : done        Create Mask : 0x0        Complete Mask : 0x0
  Next Call : 10
  Calls Traced : 0                     FPC : 5   PIC : 0
  Identifier : call_trace_id_11        Trace file :
call_trace_id_11_02112012_205932
  Status : done        Create Mask : 0x40       Complete Mask : 0x40
  Calls Traced : 0
  Identifier : call_trace_id_12        Trace file :
call_trace_id_12_02112012_210001
  Status : not-done    Create Mask : 0x40       Complete Mask : 0x0
  Next Call : 5
  Calls Traced : 0                     FPC : 4   PIC : 0
  Identifier : call_trace_id_13        Trace file :
call_trace_id_13_02112012_210353
```

```
Status : duplicate   Create Mask : 0x0        Complete Mask : 0x0
Next Call : 5
Calls Traced : 0                    FPC : 4   PIC : 0
```

## request unified-edge sgw call-trace start

**Syntax**

request unified-edge sgw call-trace start
<fpc-slot *slot*>
<imsi *imsi*>
<msisdn *msisdn*>
<next-call *next-call*>
<pic-slot *slot*>

**Release Information**

Command introduced in Junos OS Mobility Release 11.4W.

**Description**

Start the subscriber call tracing on one or more Serving Gateways (S-GWs).

**Options**

**none**—Start the subscriber call tracing.

**fpc-slot *slot***—(Optional) Start the call tracing for subscribers on the specified FPC slot.

**imsi *imsi***—(Optional) Start the call tracing for subscribers with the specified International Mobile Subscriber Identity (IMSI) number.

**msisdn *msisdn***—(Optional) Start the call tracing for subscribers with the specified Mobile station ISDN (MSIDSN) number.

**next-call *next-call***—(Optional) Start the call tracing for the specified number of next call events (1 through 50). For example, if you specify 10, then the next 10 calls will be traced.

**pic-slot *slot***—(Optional) Start the call tracing for subscribers on the specified PIC slot. You must specify an FPC slot before specifying a PIC slot number.

**Required Privilege Level**

unified-edge

**Related Documentation**

- request unified-edge sgw call-trace clear on page 1377
- request unified-edge sgw call-trace show on page 1378
- request unified-edge sgw call-trace stop on page 1383

**List of Sample Output**

request unified-edge sgw call-trace start fpc-slot 4 pic-slot 0 next-call 10 on page 1382

**Output Fields**

Table 129 on page 1381 lists the output fields for the **request unified-edge sgw call-trace start** command. Output fields are listed in the approximate order in which they appear.

### Table 129: request unified-edge sgw call-trace start Output Fields

| Field Name | Field Description |
|---|---|
| **Session PIC** | Session PIC for which the call trace status is displayed. |

Table 129: request unified-edge sgw call-trace start Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Status** | Status of the call trace:<br>• **duplicate**—Another call trace record is present that has the same attributes.<br>• **success**—Call trace started successfully.<br>• **fail**—Call tracing could not be started. |

## Sample Output

**request unified-edge sgw call-trace start fpc-slot 4 pic-slot 0 next-call 10**

```
user@host> request unified-edge sgw call-trace start fpc-slot 4 pic-slot 0 next-call 10
       Session PIC            Status
       ms-0/0/0             success
       ms-1/0/0             success
```

## request unified-edge sgw call-trace stop

**Syntax** request unified-edge sgw call-trace stop
<all>
<identifier *call-trace-identifier*>

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Stop the previously configured subscriber call tracing on one or more Serving Gateways (S-GWs).

**Options** **none**—(Same as all) Stop all the subscriber call tracing options.

**all**—(Optional) Stop all the subscriber call tracing operations.

**identifier *identifier***—(Optional) Stop the call tracing for the specified call trace identifier.

**Required Privilege Level** unified-edge

**Related Documentation**
- request unified-edge sgw call-trace clear on page 1377
- request unified-edge sgw call-trace show on page 1378
- request unified-edge sgw call-trace start on page 1381

**List of Sample Output** request unified-edge sgw call-trace stop on page 1383

**Output Fields** Table 130 on page 1383 lists the output fields for the **request unified-edge sgw call-trace stop** command. Output fields are listed in the approximate order in which they appear.

### Table 130: request unified-edge sgw call-trace stop Output Fields

| Field Name | Field Description |
|---|---|
| **Session PIC** | Session PIC for which the call trace status is displayed. |
| **Status** | Status of the call trace:<br>• **success**—Call trace stopped successfully.<br>• **fail**—Call tracing could not be stopped. |

## Sample Output

**request unified-edge sgw call-trace stop**

```
user@host> request unified-edge sgw call-trace stop
        Session PIC            Status
        ms-0/0/0             success
        ms-1/0/0             success
```

CHAPTER 38

# System Architecture Operational Commands

## clear unified-edge sgw idle-mode-buffering statistics

**Syntax** **clear unified-edge sgw idle-mode-buffering statistics**
**<all>**
**<fpc-slot *fpc-slot*>**
**<gateway *gateway*>**
**<pic-slot *pic-slot*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Clear the idle mode buffering statistics for one or more Serving Gateways (S-GWs). If a gateway name is not specified, then statistics for all S-GWs are cleared.

**Options** **none**—Clear the idle mode buffering statistics for all S-GWs.

**all**—(Optional) Clear all the buffering statistics including the idle mode buffering statistics and the statistics collected during the initial bearer setup.

**fpc-slot *fpc-slot* pic-slot *pic-slot***—(Optional) Clear the idle mode buffering statistics for the specified Flexible PIC Concentrator (FPC) and PIC slot numbers.

**gateway**—(Optional) Clear the idle mode buffering statistics for all the services PICs in the specified gateway.

**Required Privilege Level** clear, unified-edge

**Related Documentation**
- show unified-edge sgw idle-mode-buffering statistics on page 1402

**List of Sample Output** clear unified-edge sgw idle-mode-buffering statistics on page 1386

**Output Fields** When you enter this command, you are provided feedback on the status of your request.

### Sample Output

**clear unified-edge sgw idle-mode-buffering statistics**

```
user@host> clear unified-edge sgw idle-mode-buffering statistics
 Cleared idle mode buffering statistics
```

## clear unified-edge sgw statistics

**Syntax** clear unified-edge sgw statistics gateway *gateway-name*

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Clear all the statistics for the specified Serving Gateway (S-GW).

**Options** gateway *gateway-name*—Clear the statistics for the specified S-GW.

**Required Privilege Level** clear, unified-edge

**Related Documentation**
- show unified-edge sgw statistics on page 1410

**List of Sample Output** clear unified-edge sgw statistics gateway SGW on page 1387

**Output Fields** No message is displayed on successful execution of this command; otherwise an error message is displayed.

### Sample Output

**clear unified-edge sgw statistics gateway SGW**

```
user@host> clear unified-edge sgw statistics gateway SGW
```

## clear unified-edge sgw subscribers

**Syntax**

**clear unified-edge sgw subscribers gateway** *gateway*
<ams-interface-name *ams-interface-name*>
<apfe-interface-name *apfe-interface-name*>
<imsi *imsi*>
<ms-interface-name *ms-interface-name*>
<msisdn *msisdn*>
<pfe-interface-name *pfe-interface-name*>

**Release Information**

Command introduced in Junos OS Mobility Release 11.4W. **ams-interface-name**, **apfe-interface-name**, **ms-interface-name**, and **pfe-interface-name** options introduced in Junos OS Mobility Release 11.4W.

**Description**

Clear the subscribers for the Serving Gateway (S-GW) based on the options specified.

**Options**

**gateway** ***gateway***—Clear the subscribers for the specified S-GW.

**ams-interface-name** ***ams-interface-name***—Clear the subscribers on the specified aggregated multiservices interface name.

**apfe-interface-name** ***apfe-interface-name***—Clear the subscribers on the specified aggregated Packet Forwarding Engine interface name.

**imsi** ***imsi***—(Optional) Clear the subscriber matching the specified International Mobile Subscriber Identity (IMSI).

**ms-interface-name** ***ms-interface-name***—Clear the subscribers on the specified multiservices interface name.

**msisdn** ***msisdn***—(Optional) Clear the subscriber matching the specified Mobile Station ISDN (MSISDN) number.

**pfe-interface-name** ***pfe-interface-name***—Clear the subscribers on the specified Packet Forwarding Engine interface name.

**Required Privilege Level**

clear, unified-edge

**Related Documentation**

- clear unified-edge sgw subscribers charging on page 1390
- clear unified-edge sgw subscribers peer on page 1391
- show unified-edge sgw subscribers on page 1421

**List of Sample Output**

clear unified-edge sgw subscribers gateway SGW on page 1389

**Output Fields**

No message is displayed on successful execution of this command; otherwise an error message is displayed.

## Sample Output

**clear unified-edge sgw subscribers gateway SGW**

```
user@host> clear unified-edge sgw subscribers gateway SGW
```

## clear unified-edge sgw subscribers charging

**Syntax** **clear unified-edge sgw subscribers charging gateway *gateway***
**<charging-profile *charging-profile*>**
**<transport-profile *transport-profile*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Clear the charging information for subscribers on the Serving Gateway (S-GW) based on the options specified.

**Options**

**gateway *gateway***—Clear the charging information for all subscribers for the specified S-GW.

**charging-profile *charging-profile***—(Optional) Clear the subscriber matching the specified charging profile name.

**transport-profile *transport-profile***—(Optional) Clear the subscriber matching the specified transport profile name.

NOTE: You must specify either a charging profile or a transport profile to run this command.

**Required Privilege Level** clear, unified-edge

**Related Documentation**

- clear unified-edge sgw subscribers on page 1388
- show unified-edge sgw subscribers on page 1421
- clear unified-edge sgw subscribers peer on page 1391

**List of Sample Output** clear unified-edge sgw subscribers charging gateway SGW on page 1390

**Output Fields** No message is displayed on successful execution of this command; otherwise an error message is displayed.

### Sample Output

**clear unified-edge sgw subscribers charging gateway SGW**

```
user@host> clear unified-edge sgw subscribers charging gateway SGW
```

## clear unified-edge sgw subscribers peer

**Syntax**

clear unified-edge sgw subscribers peer gateway *gateway* remote-addr *remote-addr*
<local-addr *local-addr*>
<routing-instance *routing-instance*>

**Release Information**

Command introduced in Junos OS Mobility Release 11.4W.

**Description**

Clear the information for subscribers anchored for the specified GPRS tunneling protocol (GTP) peer. The GTP peer can be an S4 Serving GPRS Support Node (S4-SGSN), Mobility Management Entity (MME), or a Packet Data Network Gateway (P-GW).

**Options**

gateway *gateway*—Clear the subscribers for the specified gateway.

remote-addr *remote-addr*—Clear the information for subscribers anchored on the peer with the specified IPv4 address.

local-addr *local-addr*—(Optional) Clear the subscriber matching the specified local IPv4 address of the broadband gateway on that interface.

routing-instance *routing-instance*—(Optional) Clear the subscriber matching the specified routing instance.

**Required Privilege Level**

clear, unified-edge

**Related Documentation**

- clear unified-edge sgw subscribers on page 1388
- clear unified-edge sgw subscribers charging on page 1390
- show unified-edge sgw subscribers on page 1421

**List of Sample Output**

clear unified-edge sgw subscribers peer gateway pgw remote-addr 11.11.11.2 on page 1391

**Output Fields**

No message is displayed on successful execution of this command; otherwise an error message is displayed.

### Sample Output

**clear unified-edge sgw subscribers peer gateway pgw remote-addr 11.11.11.2**

```
user@host> clear unified-edge sgw subscribers peer gateway pgw remote-addr 11.11.11.2
```

## show unified-edge gateways

**Syntax** **show unified-edge gateways**
**<brief | detail>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display information about all gateways configured on the chassis.

**Options** **none**—(Same as brief) Display information about the configured gateways in brief.

**brief | detail**—(Optional) Display the specified level of output.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge ggsn-pgw system interfaces on page 1142
- show unified-edge sgw system interfaces on page 1144

**List of Sample Output**
show unified-edge gateways brief on page 1393
show unified-edge gateways detail on page 1393

**Output Fields** Table 131 on page 1392 lists the output fields for the **show unified-edge gateways** command. Output fields are listed in the approximate order in which they appear.

### Table 131: show unified-edge gateways Field Descriptions

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway name** | Name of the gateway. | All levels |
| **Gateway type** | Type of gateway:<br>• **ggsn-pgw**—Gateway GPRS support node (GGSN) or Packet Data Network Gateway (P-GW).<br>• **sgw**—Serving Gateway (S-GW). | All levels |
| **Gateway ID** | Internal ID of the gateway. | All levels |
| **Gateway uplink mif interface** | Mobile interface, on the gateway, used for uplink packets. | **detail** |
| **Gateway downlink mif interface** | Mobile interface, on the gateway, used for downlink packets. | **detail** |
| **Gateway pfe interfaces** | Packet Forwarding Engine interfaces (**pfe-**) or aggregated Packet Forwarding Engine interfaces (**apfe-**) configured on the gateway. | **detail** |
| **Gateway session pic interfaces** | Multiservices interfaces (**ms-**) or aggregated multiservices interfaces (**ams-**) configured on the gateway. | **detail** |

## Sample Output

**show unified-edge gateways brief**

```
user@host> show unified-edge gateways brief

Total number of configured gateways: 2

Gateway name: PGW
Gateway type: ggsn-pgw
Gateway id:   1

Gateway name: SGW
Gateway type: sgw
Gateway id:   2
```

**show unified-edge gateways detail**

```
user@host> show unified-edge gateways detail

Total number of configured gateways: 2

Gateway name:                   PGW
Gateway type:                   ggsn-pgw
Gateway id:                     1
Gateway uplink mif interface:   mif.64001
Gateway downlink mif interface: ---
Gateway pfe interfaces:
                                pfe-5/0/0
Gateway session-pic interfaces:
                                ms-3/0/0

Gateway name:                   SGW
Gateway type:                   sgw
Gateway id:                     2
Gateway uplink mif interface:   mif.64003
Gateway downlink mif interface: mif.64004
Gateway pfe interfaces:
                                pfe-0/0/0
Gateway session-pic interfaces:
                                ms-1/0/0
```

## show unified-edge ggsn-pgw call-rate statistics

**Syntax** **show unified-edge ggsn-pgw call-rate statistics**
**<gateway *gateway-name*>**
**<history>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
**gateway** option introduced in Junos OS Mobility Release 11.4W.

**Description** Display the call-rate statistics for one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then information for all GGSNs and P-GWs is displayed.

**Options** **none**—Display the call-rate statistics for all GGSNs or P-GWs.

**gateway *gateway-name***—(Optional) Display the call-rate statistics for the specified GGSN or P-GW.

**history**—(Optional) Display the call-rate statistics for a specified number of past intervals. (The number of past intervals is configured using the **set call-rate-statistics history** statement at the **[edit unified-edge gateways ggsn-pgw *gateway-name*]** hierarchy level.)

**Required Privilege Level** view

**Related Documentation**
- call-rate-statistics on page 1057

**List of Sample Output**
show unified-edge ggsn-pgw call-rate statistics on page 1395
show unified-edge ggsn-pgw call-rate statistics history on page 1395

**Output Fields** Table 132 on page 1394 lists the output fields for the **show unified-edge ggsn-pgw call-rate statistics** command. Output fields are listed in the approximate order in which they appear.

### Table 132: show unified-edge ggsn-pgw call-rate statistics Output Fields

| Field Name | Field Description |
|---|---|
| **Gateway** | Name of the GGSN or P-GW. |
| **Record** | Record number for the interval in which the call-rate statistics are collected, starting from the newest record (1) to the oldest. |
| **Call-rate interval** | Interval, in minutes, for which the call-rate statistics are calculated. |
| **Control Plane** | The following control plane information is displayed:<br>• **Activations**—Number of activations during the call-rate interval.<br>• **Deactivations**—Number of deactivations during the call-rate interval. |

Table 132: show unified-edge ggsn-pgw call-rate statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Data Plane (Gn)** | The following data plane (Gn interface) information is displayed:<br>• **Input packets**—Number of data packets received during the call-rate interval.<br>• **Output packets**—Number of data packets transmitted during the call-rate interval.<br>• **Input bytes**—Number of data bytes received during the call-rate interval.<br>• **Output bytes**—Number of data bytes transmitted during the call-rate interval. |
| **Statistics collection time** | Date and time when the call-rate statistics for the record are computed. |

## Sample Output

**show unified-edge ggsn-pgw call-rate statistics**

```
user@host> show unified-edge ggsn-pgw call-rate statistics
PGW
Record 1 (Call-rate statistics for the past 5 min):
Control Plane:
        Activations:    24
        Deactivations:  0
Data Plane(Gn):
        Input Packets:  100
        Output packets: 0
        Input bytes:    12800
        Output bytes:   0
Statistics collection time: 2012-03-02 03:13:26 PST (00:00:05 ago)
```

**show unified-edge ggsn-pgw call-rate statistics history**

```
user@host> show unified-edge ggsn-pgw call-rate statistics history
Record 1 (Call-rate statistics for the past 5 min):
Control Plane:
        Activations:    10
        Deactivations:  0
Data Plane(Gn):
        Input Packets:  600
        Output packets: 600
        Input bytes:    556800
        Output bytes:   556800
Statistics collection time: 2011-05-19 02:33:05 PDT (00:01:19 ago)

Record 2 (Call-rate statistics for the past 5 min):
Control Plane:
        Activations:    9
        Deactivations:  19
Data Plane(Gn):
        Input Packets:  774
        Output packets: 774
        Input bytes:    20212
        Output bytes:   20212
Statistics collection time: 2011-05-19 02:23:05 PDT (00:06:19 ago)
```

## show unified-edge ggsn-pgw resource-manager clients

**Syntax** **show unified-edge ggsn-pgw resource-manager clients**
**<gateway *gateway*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.2W.
**gateway** option introduced in Junos OS Mobility Release 11.4W.

**Description** Display information about the resource management clients (the session Dense Port Concentrators [DPCs] and interface DPCs and Modular Port Concentrators [MPCs]) on one or more gateway GPRS support nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then information for all GGSNs and P-GWs is displayed.

**Options** **none**—Display information for one or more GGSNs or P-GWs.

**gateway *gateway-name***—(Optional) Display information for the specified gateway.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge gateways on page 1392
- show unified-edge ggsn-pgw system interfaces on page 1142

**List of Sample Output** show unified-edge ggsn-pgw resource-manager clients on page 1397

**Output Fields** Table 133 on page 1396 lists the output fields for the **show unified-edge gateways ggsn-pgw resource-manager clients** command. Output fields are listed in the approximate order in which they appear.

### Table 133: show unified-edge gateways ggsn-pgw resource-manager clients Output Fields

| Field Name | Field Description |
|---|---|
| **Client** | Name of the resource manager client slot identified by the FPC and PIC slot numbers; for example, **pfe-1/2/0** or **ms/7/0/0**. |
| **State** | Resource manager client state. **In-Service** means that the client can handle session creation requests. |
| **Role** | Role of the resource manager client slot:<br>• **Primary**—The resource manager client is a primary member.<br>• **Secondary**—The resource manager client is a secondary or backup member. |
| **Client type** | Type of resource manager client:<br>• **PFE**—Packet Forwarding Engine client used for anchoring subscribers in the gateway.<br>• **Session PIC**—Session PIC client used for the mobile control plane in the gateway<br>• **Service PIC**—services PIC used for anchoring services-related subscriber sessions in the gateway |
| **Gateway** | Name of the gateway to which the resource manager client belongs. |

## Sample Output

**show unified-edge ggsn-pgw resource-manager clients**

```
user@host> show unified-edge ggsn-pgw resource-manager clients
Client      State          Redundancy role Client type Gateway
pfe-0/0/0   In-Service     Primary         PFE         PGW
pfe-0/1/0   In-Service     Primary         PFE         PGW
pfe-0/2/0   In-Service     Primary         PFE         PGW
pfe-0/3/0   In-Service     Primary         PFE         PGW
ms-2/0/0    In-Service     Primary         Service-PIC PGW
ms-2/1/0    In-Service     Secondary       Service-PIC PGW
ms-3/0/0    In-Service     Primary         Service-PIC PGW
ms-3/1/0    In-Service     Primary         Service-PIC PGW
ms-5/0/0    In-Service     Primary         Session-PIC PGW
ms-5/1/0    In-Service     Secondary       Session-PIC PGW
```

## show unified-edge ggsn-pgw system interfaces service-mode

**Syntax** show unified-edge ggsn-pgw system interfaces service-mode
<brief | detail>
<gateway-name *gateway-name*>

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the service mode information for the interfaces on one or more Gateway GPRS Support Nodes (GGSNs) or Packet Data Network Gateways (P-GWs). If a GGSN or P-GW is not specified, then information for all GGSNs and P-GWs is displayed.

**Options**

**none**—(Same as brief) Display service mode information for one or more GGSNs and P-GWs.

**brief | detail**—(Optional) Display the specified level of output.

**gateway-name *gateway-name***—(Optional) Display service mode information for the specified gateway.

**Required Privilege Level** view

**Related Documentation**

- show unified-edge ggsn-pgw system interfaces on page 1142

**List of Sample Output**

show unified-edge ggsn-pgw system interfaces service-mode brief on page 1399
show unified-edge ggsn-pgw system interfaces service-mode detail on page 1399

**Output Fields** Table 134 on page 1398 lists the output fields for the **show unified-edge ggsn-pgw system interfaces service-mode** command. Output fields are listed in the approximate order in which they appear.

### Table 134: show unified-edge ggsn-pgw system interfaces service-mode

| Field Name | Field Description |
|---|---|
| **Interface Name** | Name of the interface for which the service mode information is displayed:<br>• Aggregated multiservices; for example, **ams0**<br>• Aggregated Packet Forwarding Engine; for example, **apfe1**<br>• Multiservices; for example, **ms-1/0/0** |
| **Gateway Name** | Name of the GGSN or P-GW. |

Table 134: show unified-edge ggsn-pgw system interfaces service-mode *(continued)*

| Field Name | Field Description |
|---|---|
| **Service Mode** | Service mode for the gateway. The following service modes are possible:<br>• Operational—Gateway is in operational mode.<br>• Maintenance—Gateway is in maintenance mode.<br>• **MM Active Phase**—In this mode, you can make changes to all of the configuration options.<br>• **MM In/Out Phase**—In this mode, you can only make changes to the configuration options for the non-maintenance-mode attributes. |

## Sample Output

**show unified-edge ggsn-pgw system interfaces service-mode brief**

```
user@host> show unified-edge ggsn-pgw system interfaces service-mode brief
Maintenance Mode
    MM Active Phase - System is ready to accept configuration changes for all
                      attributes of this object and its sub-hierarchies.
    MM In/Out Phase - System is ready to accept configuration changes only for
                      non-maintenance mode attributes of this object and
                      its sub-hierarchies.

Interface Name     Gateway Name                    Service Mode

pfe-2/1/0          PGW                             Operational
ams1               PGW                             Operational
```

**show unified-edge ggsn-pgw system interfaces service-mode detail**

```
user@host> show unified-edge ggsn-pgw system interfaces service-mode detail
Service Mode Status
Interface Name  : pfe-2/1/0
Gateway Name    : PGW
Service Mode    : Operational
Service Mode Status
Interface Name  : ams1
Gateway Name    : PGW
Service Mode    : Operational
```

## show unified-edge sgw call-rate statistics

**Syntax** **show unified-edge sgw call-rate statistics**
**<gateway *gateway-name*>**
**<history>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the call-rate statistics for one or more Serving Gateways (S-GWs). If a gateway is not specified, then information for all S-GWs is displayed.

**Options** **none**—Display the call-rate statistics for all S-GWs.

**gateway *gateway-name***—(Optional) Display the call-rate statistics for the specified gateway.

**history**—(Optional) Display the call-rate statistics for a specified number of past intervals. (The number of past intervals is configured using the **set call-rate-statistics history** statement at the **[edit unified-edge gateways sgw *gateway-name*]** hierarchy level.)

**Required Privilege Level** view

**Related Documentation**
- call-rate-statistics on page 1057

**List of Sample Output**
show unified-edge sgw call-rate statistics on page 1401
show unified-edge sgw call-rate statistics history on page 1401

**Output Fields** Table 135 on page 1400 lists the output fields for the **show unified-edge sgw call-rate statistics** command. Output fields are listed in the approximate order in which they appear.

### Table 135: show unified-edge sgw call-rate statistics Output Fields

| Field Name | Field Description |
|---|---|
| **Gateway** | Name of the S-GW. |
| **Record** | Record number for the interval in which the call-rate statistics are collected, starting from the newest record (1) to the oldest. |
| **Call-rate interval** | Interval, in minutes, for which the call-rate statistics are calculated. |
| **Control Plane** | The following control plane information is displayed:<br>• **Activations**—Number of activations during the call-rate interval.<br>• **Deactivations**—Number of deactivations during the call-rate interval. |

Table 135: show unified-edge sgw call-rate statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Data Plane (Gn)** | The following data plane (Gn interface) information is displayed:<br>• **Input packets**—Number of data packets received during the call-rate interval.<br>• **Output packets**—Number of data packets transmitted during the call-rate interval.<br>• **Input bytes**—Number of data bytes received during the call-rate interval.<br>• **Output bytes**—Number of data bytes transmitted during the call-rate interval. |
| **Statistics collection time** | Date and time when the call-rate statistics for the record are computed. |

## Sample Output

**show unified-edge sgw call-rate statistics**

```
user@host> show unified-edge sgw call-rate statistics
Gateway: SGW
Record 1 (Call-rate statistics for the past 10 min):
Control Plane:
        Activations:    1
        Deactivations:  0
Data Plane(Gn):
        Input Packets:  0
        Output packets: 2
        Input bytes:    0
        Output bytes:   584
Statistics collection time: 2011-12-09 21:08:30 PST (00:00:49 ago)
```

**show unified-edge sgw call-rate statistics history**

```
user@host> show unified-edge sgw call-rate statistics history
Gateway: SGW
Record 1 (Call-rate statistics for the past 10 min):
Control Plane:
        Activations:    1
        Deactivations:  0
Data Plane(Gn):
        Input Packets:  0
        Output packets: 2
        Input bytes:    0
        Output bytes:   584
Statistics collection time: 2011-12-09 21:08:30 PST (00:01:17 ago)
```

## show unified-edge sgw idle-mode-buffering statistics

**Syntax** **show unified-edge sgw idle-mode-buffering statistics**
**<brief | detail>**
**<fpc-slot *fpc-slot*>**
**<gateway *gateway*>**
**<pic-slot *pic-slot*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the idle mode buffering statistics for one or more Serving Gateways (S-GWs). If a gateway name is not specified, then statistics for all S-GWs are displayed.

**Options** **none**—(Same as brief) Display the idle mode buffering statistics for all S-GWs.

**brief | detail**—(Optional) Display the specified level of output.

NOTE: The **brief** option displays the aggregated statistics from all the services PICs for each S-GW. The **detail** option displays the statistics for each services PIC separately for each S-GW.

**fpc-slot *fpc-slot* pic-slot *pic-slot***—(Optional) Display the idle mode buffering statistics for the specified Flexible PIC Concentrator (FPC) and PIC slot numbers.

**gateway**—(Optional) Display the idle mode buffering statistics for all the services PICs in the specified gateway.

**Required Privilege Level** view

**Related Documentation**
- clear unified-edge sgw idle-mode-buffering statistics on page 1386

**List of Sample Output**
show unified-edge sgw idle-mode-buffering statistics brief on page 1404
show unified-edge sgw idle-mode-buffering statistics detail on page 1405

**Output Fields** Table 136 on page 1402 lists the output fields for the **show unified-edge sgw idle-mode-buffering statistics** command. Output fields are listed in the approximate order in which they appear.

### Table 136: show unified-edge sgw idle-mode-buffering statistics Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the S-GW. | **All levels** |
| **FPC Slot** | FPC slot number for which the statistics are displayed. | **detail** |
| **PIC slot** | PIC slot number for which the statistics are displayed. | **detail** |

Table 136: show unified-edge sgw idle-mode-buffering statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| Idle Mode Buffering Statistics:<br>—The following idle mode buffering statistics related to GTPv1 downlink are displayed. | | |
| **Total Packets received** | Total number of packets received from the Packet Forwarding Engine for idle subscribers. | **All levels** |
| **Invalid packets** | Total number of packets received that failed validation checks; these packets are received from the Packet Forwarding Engine. | **All levels** |
| **Flows created** | Total number of flows created to handle packets. | **All levels** |
| **Flows aged out** | Total number of flows aged out. | **All levels** |
| **Active Flows** | Number of current active flows. | **All levels** |
| **Active Buffered Flows** | Number of active flows that are currently being buffered. | **All levels** |
| Buffering Statistics<br>—The following consolidated statistics are displayed for packets buffered for idle subscribers and for packets buffered during the initial bearer setup. | | |
| **Active Buffered Flows** | Number of current active flows that are handling buffering for idle subscribers and for packets buffered during initial bearer setup. | **All levels** |
| **Packets/Bytes** | The following information about packets that need buffering is displayed:<br>• **Total Received**—Total number of packets received from the Packet Forwarding Engine for idle subscribers and buffered during initial bearer setup.<br>• **Invalid**—Total number of packets received that failed validation checks.<br>• **Current Buffered**—Number of currently buffered packets and their size, in bytes.<br>• **Reinjected**—Total number of packets reinjected to the Packet Forwarding Engine and their size, in bytes.<br>• **Dropped (Exceeded limit)**—Total number of packets dropped because the buffering limit was exceeded and the size of the dropped packets, in bytes.<br>• **Buffered (Dropped)**—Total number of buffered packets that were dropped and their size, in bytes. | **All levels** |

Table 136: show unified-edge sgw idle-mode-buffering statistics Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Limit Exceeded** | The following information about the number of times that the buffer and memory limits are exceeded is displayed:<br>• **Dedicated buffer-limit**—Number of times the dedicated buffer limit of 2 KB is exceeded.<br>• **Shared buffer-limit**—Number of times the shared buffer limit of 10 KB is exceeded.<br>• **Dedicated memory-limit**—Number of times the dedicated memory limit of 75 percent is exceeded.<br>• **Shared memory-limit**—Number of times the shared memory limit of 25 percent is exceeded. | **All levels** |
| **Memory Usage** | The following information about memory usage is displayed:<br>• **Memory used (Bytes)**—Amount of dedicated and shared memory used, in bytes.<br>• **Memory free (Bytes)**—Amount of free memory, in bytes.<br>• **Dedicated memory used (%)**—Percentage of dedicated memory used.<br>• **Shared memory used (%)**—Percentage of shared memory used. | **All levels** |

## Sample Output

**show unified-edge sgw idle-mode-buffering statistics brief**

```
user@host> show unified-edge sgw idle-mode-buffering statistics brief
Gateway: SGW

Idle Mode Buffering statistics:
GTPv1 Downlink:
  Total Packets received:                    102
  Invalid packets:                             0
  Flows created:                              12
  Flows aged out:                              0
  Active Flows:                               10
  Active Buffered Flows:                      10


Buffering statistics:
  Active Buffered Flows:                      10
  Packets/Bytes:
    Total Received:                          102
    Invalid:                                   0
    Current Buffered:                    100 / 16400
    Reinjected:                            2 / 280
    Dropped (Exceeded limit):              0 / 0
    Buffered Dropped:                      0 / 0
  Limit Exceeded:
    Dedicated buffer-limit:                    0
    Shared buffer-limit:                       0
    Dedicated memory-limit:                    0
    Shared memory-limit:                       0
  Memory Usage:
    Memory used (Bytes):                 7991432
    Memory free (Bytes):               124129144
```

```
    Dedicated memory used (%):                  0
    Shared memory used (%):                     0
```

### show unified-edge sgw idle-mode-buffering statistics detail

```
user@host> show unified-edge sgw idle-mode-buffering statistics detail
Gateway: SGW

Idle Mode Buffering statistics (FPC 0 PIC 0):
GTPv1 Downlink:
  Total Packets received:                     102
  Invalid packets:                              0
  Flows created:                               12
  Flows aged out:                               0
  Active Flows:                                 0
  Active Buffered Flows:                        0


Buffering statistics (FPC 0 PIC 0):
  Active Buffered Flows:                        0
  Packets/Bytes:
    Total Received:                           102
    Invalid:                                    0
    Current Buffered:                           0 / 0
    Reinjected:                                 2 / 280
    Dropped (Exceeded limit):                   0 / 0
    Buffered Dropped:                         100 / 16400
  Limit Exceeded:
    Dedicated buffer-limit:                     0
    Shared buffer-limit:                        0
    Dedicated memory-limit:                     0
    Shared memory-limit:                        0
  Memory Usage:
    Memory used (Bytes):                  7954632
    Memory free (Bytes):                124165944
    Dedicated memory used (%):                  0
    Shared memory used (%):                     0
```

## show unified-edge sgw resource-manager clients

**Syntax** **show unified-edge sgw resource-manager clients**
**<gateway *gateway*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display information about the resource management clients (the session Dense Port Concentrators [DPCs] and interface DPCs and Modular Port Concentrators [MPCs]) on one or more configured Serving Gateways (S-GWs). If a gateway is not specified, then information for all configured S-GWs is displayed.

**Options** **gateway *gateway***—(Optional) Display resource management information for the specified gateway.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge gateways on page 1392
- show unified-edge sgw system interfaces on page 1144

**List of Sample Output** show unified-edge sgw resource-manager clients on page 1407

**Output Fields** Table 137 on page 1406 lists the output fields for the **show unified-edge sgw resource-manager clients** command. Output fields are listed in the approximate order in which they appear.

### Table 137: show unified-edge sgw resource-manager clients Output Fields

| Field Name | Field Description |
|---|---|
| **Client** | Name of the resource manager client slot identified by the FPC and PIC slot numbers; for example, **pfe-1/2/0** or **ms/7/0/0**. |
| **State** | Resource manager client state. **In-Service** means that the client can handle session creation requests. |
| **Redundancy Role** | Redundancy role of the resource manager client slot:<br>• **Primary**—The resource manager client is a primary member.<br>• **Secondary**—The resource manager client is a secondary or backup member. |
| **Client type** | Type of resource manager client:<br>• **PFE**—Packet Forwarding Engine client used for anchoring subscribers in the gateway.<br>• **Session PIC**—Session PIC client used for the mobile control plane in the gateway |
| **Gateway** | Name of the gateway to which the resource manager client belongs. |

## Sample Output

**show unified-edge sgw resource-manager clients**

```
user@host> show unified-edge sgw resource-manager clients
Client      State          Redundancy role Client type Gateway
pfe-0/0/0   In-Service     Secondary       PFE         SGW
pfe-1/0/0   In-Service     Primary         PFE         SGW
ms-5/0/0    In-Service     Primary         Session-PIC SGW
ms-5/1/0    In-Service     Secondary       Session-PIC SGW
```

## show unified-edge sgw service-mode

**Syntax** **show unified-edge sgw service-mode**
**<brief | detail>**
**<gateway *gateway-name*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the service mode information for one or more Serving Gateways (S-GWs). If a gateway is not specified, then information for all S-GWs is displayed.

**Options** **none**—(Same as brief) Display the service mode information in brief.

**brief | detail**—(Optional) Display the specified level of output.

**gateway *gateway-name***—(Optional) Display the service mode information for the specified gateway.

**Required Privilege Level** view

**Related Documentation**
- service-mode (Serving Gateway) on page 994

**List of Sample Output**
show unified-edge sgw service-mode brief on page 1408
show unified-edge sgw service-mode detail on page 1409

**Output Fields** Table 138 on page 1408 lists the output fields for the **show unified-edge sgw service-mode** command. Output fields are listed in the approximate order in which they appear.

### Table 138: show unified-edge sgw service-mode Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway Name** | Name of the S-GW. | All levels |
| **Service Mode** | Service mode for the gateway:<br>• Operational—Gateway is in operational mode.<br>• Maintenance—Gateway is in maintenance mode. | All levels |

## Sample Output

**show unified-edge sgw service-mode brief**

```
user@host> show unified-edge sgw service-mode brief
Maintenance Mode
    MM Active Phase - System is ready to accept configuration changes for all
                      attributes of this object and its sub-hierarchies.
    MM In/Out Phase - System is ready to accept configuration changes only for
                      non-maintenance mode attributes of this object and
                      its sub-hierarchies.

Gateway Name                    Service Mode
```

```
SGW                             Operational
SGW2                            Operational
```

**show unified-edge sgw service-mode detail**

```
user@host> show unified-edge sgw service-mode detail
Service Mode Status
Gateway Name    : SGW
Service Mode    : Operational
Service Mode Status
Gateway Name    : SGW2
Service Mode    : Operational
```

## show unified-edge sgw statistics

**Syntax** **show unified-edge sgw statistics**
**<gateway *gateway*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the statistics for one or more Serving Gateways (S-GWs). If a gateway name is not specified, then statistics for all S-GWs are displayed.

**Options** **none**—Display statistics for all S-GWs.

**gateway *gateway***—(Optional) Display statistics for the specified gateway.

**Required Privilege Level** view

**Related Documentation**
- clear unified-edge sgw statistics on page 1387

**List of Sample Output** show unified-edge sgw statistics on page 1411

**Output Fields** Table 139 on page 1410 lists the output fields for the **show unified-edge sgw statistics** command. Output fields are listed in the approximate order in which they appear.

### Table 139: show unified-edge sgw statistics Output Fields

| Field Name | Field Description |
|---|---|
| **Gateway** | Name of the S-GW. |
| Control Plane Statistics | |
| **Session establishment attempts** | Number of attempted session establishments. |
| **Successful session establishments** | Number of session successfully established. |
| **Dedicated bearer creation attempts** | Number of times the creation of dedicated bearers was attempted. |
| **Successful dedicated bearer creations** | Number of dedicated bearers successfully created. |
| **Session deactivation attempts** | Number of attempted session deactivations. |
| **Successful session deactivations** | Number of sessions successfully deactivated. |
| **Dedicated bearer deactivation attempts** | Number of times the deactivation of dedicated bearers was attempted. |
| **Successful dedicated bearer deactivations** | Number of dedicated bearers successfully deactivated. |
| **Inter-RAT handover attempts** | Number of Inter-RAT handovers attempted. |
| **Inter-RAT handover successful** | Number of successful Inter-RAT handovers. |

Table 139: show unified-edge sgw statistics Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **X2 based handover attempts** | Number of X2-based handovers attempted. |
| **X2 based handover successful** | Number of successful X2-based handovers. |
| **S1 based handover attempts** | Number of S1-based handovers attempted. |
| **S1 based handover successful** | Number of successful S1-based handovers. |
| **Idle mode TAU/RAU attempts** | Number of Tracking Area Updates (TAU) or Routing Area Updates (RAUs) attempted when the user equipment was in idle mode. |
| **Idle mode TAU/RAU successful** | Number of successful TAUs or RAUs when the user equipment was in idle mode. |
| **Service request procedure attempts** | Number of service request procedures attempted. |
| **Service request procedure successful** | Number of successful service request procedures. |
| Data Plane GTP Statistics (S5/S8) | |
| **Input packets** | Number of incoming GTP data packets on the S5, and S8 interfaces. |
| **Input bytes** | Number of octets of incoming GTP data packets on the S5, and S8 interfaces. |
| **Output packets** | Number of outgoing GTP data packets on the S5, and S8 interfaces. |
| **Output bytes** | Number of octets of outgoing GTP data packets on the S5, and S8 interfaces. |
| Data plane GTP statistics (S4/S12/S1-U) | |
| **Input packets** | Number of incoming GTP data packets on the S1-U, S12, and S4 interfaces. |
| **Input bytes** | Number of octets of incoming GTP data packets on the S1-U, S12, and S4 interfaces. |
| **Output packets** | Number of outgoing GTP data packets on the S1-U, S12, and S4 interfaces. |
| **Output bytes** | Number of octets of outgoing GTP data packets on the S1-U, S12, and S4 interfaces. |

## Sample Output

**show unified-edge sgw statistics**

```
user@host> show unified-edge sgw statistics
Gateway: SGW
Control plane statistics:
    Session establishment attempts:                    2438203
    Successful session establishments:                 2069870
    Dedicated bearer creation attempts:                0
    Successful dedicated bearer creations:             0
```

```
    Session deactivation attempts:                              0
    Successful session deactivations:                           0
    Dedicated bearer deactivation attempts:                     0
    Successful dedicated bearer deactivations:                  0
    Inter-RAT handover attempts:                                0
    Inter-RAT handover successful:                              0
    X2 based handover attempts:                                 197863
    X2 based handover successful:                               197863
    S1 based handover attempts:                                 0
    S1 based handover successful:                               0
    Idle mode TAU/RAU attempts:                                 0
    Idle mode TAU/RAU successful:                               0
    Service request procedure attempts:                         0
    Service request procedure successful:                       0
Data plane GTP statistics (S5/S8):
    Input     packets:          292994029
    Input     bytes:            37503235712
    Output    packets:          298519448
    Output    bytes:            38210489344
Data plane GTP statistics (S4/S12/S1-U):
    Input     packets:          298519448
    Input     bytes:            38210489344
    Output    packets:          292994029
    Output    bytes:            37503235712
```

## show unified-edge sgw status

**Syntax**

**show unified-edge sgw status**
**<brief | detail>**
**<fpc-slot *fpc-slot*>**
**<gateway *gateway*>**
**<gtpv2-priority-level *gtpv2-priority-level*>**
**<pic-slot *pic-slot*>**
**<qci *qci*>**
**<rat-type (eutran | gan | geran | hspa | others | utran | wlan)>**

**Release Information**

Command introduced in Junos OS Mobility Release 11.4W.

**Description**

Display the status information, such as the number of subscribers, active sessions, and so on, for one or more Serving Gateways (S-GWs). If a gateway name is not specified, then the status information for all the S-GWs is displayed.

**Options**

**none**—(Same as brief) Display the gateway status information in brief.

**brief | detail** —(Optional) Display the specified level of output.

**fpc-slot *fpc-slot***—(Optional) Display the status information for the specified FPC slot number.

**gateway *gateway***—(Optional) Display the status information for the specified gateway name.

**gtpv2-priority-level *gtpv2-priority-level***—(Optional) Display the status information for the GTPv2 priority specified. You can specify a priority of 1 through 15.

**pic-slot *pic-slot***—(Optional) Display the status information for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**qci *qci***—(Optional) Display the status information for the specified QoS Class Identifier (QCI).

**rat-type (eutran | gan | geran | hspa | others | utran | wlan)**—(Optional) Display the status information for the specified Radio Access Technology (RAT).

**Required Privilege Level**

view

**Related Documentation**

- show unified-edge sgw status gtp-peer on page 1416
- show unified-edge sgw status preemption-list on page 1272
- show unified-edge sgw status session-state on page 1418

**List of Sample Output**

show unified-edge sgw status brief on page 1415
show unified-edge sgw status detail on page 1415

**Output Fields** Table 140 on page 1414 lists the output fields for the **show unified-edge sgw status** command. Output fields are listed in the approximate order in which they appear.

### Table 140: show unified-edge sgw status Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the S-GW. | All levels |
| **FPC SLOT** | FPC slot number of the interface for which the status information is displayed. | **detail** |
| **PIC SLOT** | PIC slot number of the FPC for which the status information is displayed. | **detail** |
| **State** | State of the services or session PIC on the S-GW:<br>• **Standalone**<br>• **Active**—PIC is an active member.<br>• **Backup**—PIC is a backup. | **detail** |
| **Type** | Indicates whether the PIC is a session PIC or a services PIC. | **detail** |
| **Active Subscribers** | Number of active subscribers on the gateway. | All levels |
| **Active Sessions** | Number of active sessions on the gateway. | All levels |
| **Active Bearers** | Number of bearers in Active state. | All levels |
| **Idle Subscribers** | Number of idle subscribers on the gateway. | All levels |
| **Idle Sessions** | Number of idle sessions on the gateway. | All levels |
| **Idle Bearers** | Number of idle bearers on the gateway. | All levels |
| **Suspended Subscribers** | Number of suspended subscribers on the gateway. | All levels |
| **Suspended Sessions** | Number of suspended sessions on the gateway. | All levels |
| **Suspended Bearers** | Number of suspended bearers on the gateway. | All levels |
| **Indirect Tunnels** | Number of indirect tunnels created during handover procedures. | All levels |
| **Direct Tunnels** | Number of direct tunnels created to the Radio Network Controller (RNC). | All levels |
| **CPU Load (%)** | Percentage of the CPU load. | All levels |
| **Memory Load (%)** | Percentage of the memory load. | All levels |

## Sample Output

**show unified-edge sgw status brief**

```
user@host> show unified-edge sgw status brief
Gateway: SGW
    Active Subscribers             :              3
    Active Sessions                   :              3
    Active Bearers                     :              11
    Idle Subscribers                  :              0
    Idle Sessions                        :              0
    Suspended Subscribers   :              0
    Suspended Sessions         :              0
    Indirect Tunnels                  :              0
    Direct Tunnels                      :              11
    Idle Bearers                         :              0
    Suspended Bearers           :              0
    CPU Load (%)                       :              4
    Memory Load (%)              :              23
```

**show unified-edge sgw status detail**

```
user@host> show unified-edge sgw status detail
Gateway: SGW

    FPC SLOT: 0   PIC SLOT: 0
    State                                 :             Standalone
    Type                                  :             Session-PIC
    Active Subscribers                   :             1
    Active Sessions                      :             1
    Active Bearers                       :             1
    Idle Subscribers                     :             0
    Idle Sessions                        :             0
    Suspended Subscribers          :             0
    Suspended Sessions                   :             0
    Indirect Tunnels                     :             0
    Direct Tunnels                       :             1
    Idle Bearers                         :             0
    Suspended Bearers                    :             0
    CPU Load (%)                         :             0
    Memory Load (%)                      :             23
```

## show unified-edge sgw status gtp-peer

**Syntax** **show unified-edge sgw status gtp-peer remote-address *remote-address***
**<fpc-slot *fpc-slot*>**
**<gateway *gateway*>**
**<local-address *local-address*>**
**<pic-slot *pic-slot*>**
**<routing-instance *name*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Displays the count of the bearer distribution across multiple Packet Forwarding Engines for the specified GTP peer on one or more Serving Gateways (S-GWs). If an S-GW is not specified, then information for all S-GWs is displayed.

**Options**

**remote-address *remote-address***—Display the information for the GTP peer with the specified remote address.

**fpc-slot *fpc-slot***—(Optional) Display the information for the specified FPC slot number pertaining to the session PIC.

**gateway *gateway***—(Optional) Display the information for the specified S-GW.

**local-address *local-address***—(Optional) Display the information for the local address of the specified peer on the gateway.

**pic-slot *pic-slot***—(Optional) Display the information for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**routing-instance *routing-instance***—(Optional) Display the information for the peer on the specified routing instance ID.

**Required Privilege Level** unified-edge, view

**Related Documentation**
- show unified-edge sgw status on page 1413

**List of Sample Output** show unified-edge sgw status gtp-peer remote-address 2.2.2.1 on page 1417

**Output Fields** Table 141 on page 1416 lists the output fields for the **show unified-edge sgw status gtp-peer** command. Output fields are listed in the approximate order in which they appear.

### Table 141: show unified-edge sgw status gtp-peer Output Fields

| Field Name | Field Description |
|---|---|
| **Gateway** | Name of the S-GW. |
| **FPC-slot/PIC-slot** | FPC and PIC slot numbers of the aggregated Packet Forwarding Engine interface for which the information is displayed. |

Table 141: show unified-edge sgw status gtp-peer Output Fields *(continued)*

| Field Name | Field Description |
|---|---|
| **Number of bearers** | Number of bearers on the corresponding FCP and PIC slot. |

## Sample Output

**show unified-edge sgw status gtp-peer remote-address 2.2.2.1**

```
user@host> show unified-edge sgw status gtp-peer remote-address 2.2.2.1
Gateway: S`GW
    FPC-slot/PIC-slot            Number of bearers
    ---------------------------------------------
           0/0                           1
           0/1                           0
```

## show unified-edge sgw status session-state

**Syntax** **show unified-edge sgw status session-state**
**<brief | detail>**
**<fpc-slot *fpc-slot*>**
**<gateway *gateway*>**
**<pic-slot *pic-slot*>**

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the session state information of subscribers anchored on one or more Serving Gateways (S-GWs). If a gateway name is not specified, then the session state information for all the S-GWs is displayed.

**Options** **none**—(Same as brief) Display the session state information in brief.

**brief | detail** —(Optional) Display the specified level of output.

**fpc-slot *fpc-slot* pic-slot *pic-slot***—(Optional) Display the session state information for the PIC in the specified FPC and PIC slot numbers.

**gateway *gateway***—(Optional) Display the session state information for the specified gateway name.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge sgw status on page 1413

**List of Sample Output**
show unified-edge sgw status session-state brief on page 1419
show unified-edge sgw status session-state detail on page 1420

**Output Fields** Table 142 on page 1418 lists the output fields for the **show unified-edge sgw status session-state** command. Output fields are listed in the approximate order in which they appear.

### Table 142: show unified-edge sgw status session-state Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the S-GW. | All levels<br>none |
| **FPC Slot** | FPC slot number of the interface for which the session state information is displayed. | **detail** |
| **PIC Slot** | PIC slot number of the FPC for which the session state information is displayed. | **detail** |

Table 142: show unified-edge sgw status session-state Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Initial** | Number of sessions being initialized. | All levels<br>none |
| **Default bearer setup wait** | Number of sessions waiting for the default bearer to be set up. | All levels<br>none |
| **Sync wait** | Number of sessions waiting for the synchronization to the backup services PIC. | All levels<br>none |
| **Established** | Number of sessions established. | All levels<br>none |
| **Cleaning up** | Number of sessions being cleaned up. | All levels<br>none |
| **Idle mode** | Number of sessions in idle mode. | All levels<br>none |
| **Suspended** | Number of suspended sessions. | All levels<br>none |
| **PFE wait** | Number of sessions waiting for a response from the Packet Forwarding Engine. | All levels<br>none |
| **PGW wait** | Number of sessions waiting for a response from the Packet Data Network Gateway (P-GW) during handovers. | All levels<br>none |
| **MME wait** | Number of sessions waiting for a request from the Mobility Management Entity (MME) during handovers. | All levels<br>none |

## Sample Output

**show unified-edge sgw status session-state brief**

```
user@host> show unified-edge sgw status session-state brief
Gateway: SGW
    Initial                    :              0
    Default bearer setup wait  :              0
    Sync wait                  :              0
    Established                :              1
    Cleaning up                :              0
    Idle mode                  :              0
    Suspended                  :              0
    PFE wait                   :              0
```

```
    PGW wait                    :              0
    MME wait                    :              0
```

**show unified-edge sgw status session-state detail**

```
user@host> show unified-edge sgw session-state detail
Gateway: SGW
    Mobile gateway status of fpc slot: 5  pic slot: 0
    Initial                     :              0
    Default bearer setup wait   :              0
    Sync wait                   :              0
    Established                 :              1
    Cleaning up                 :              0
    Idle mode                   :              0
    Suspended                   :              0
    PFE wait                    :              0
    PGW wait                    :              0
    MME wait                    :              0

    Mobile gateway status of fpc slot: 5  pic slot: 1
    Initial                     :              0
    Default bearer setup wait   :              0
    Sync wait                   :              0
    Established                 :              1
    Cleaning up                 :              0
    Idle mode                   :              0
    Suspended                   :              0
    PFE wait                    :              0
    PGW wait                    :              0
    MME wait                    :              0
```

## show unified-edge sgw subscribers

**Syntax**

**show unified-edge sgw subscribers**
<**brief | extensive**>
<**fpc-slot** *fpc-slot*>
<**gateway** *gateway*>
<**gtpv2-priority-level** *gtpv2-priority-level*>
<**imsi** *imsi*>
<**msisdn** *msisdn*>
<pdn-type (ipv4 | ipv4-v6 | ipv6)>
<**peer** *peer*>
<**pic-slot** *pic-slot*>
<**qci** *qci*>
<roaming-status (home | roamer | visitor)>

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the subscriber information for one or more Serving Gateways (S-GWs). If a gateway name is not specified, then the subscriber information for all the S-GWs is displayed.

**Options**

**none**—(Same as brief) Display the subscriber information in brief.

**brief | extensive** —(Optional) Display the specified level of output.

**fpc-slot** *fpc-slot*—(Optional) Display the subscriber information for the specified FPC slot number.

**gateway** *gateway*—(Optional) Display the subscriber information for the specified gateway.

**gtpv2-priority-level** *gtpv2-priority-level*—(Optional) Display the subscriber information for the GTPv2 priority specified. You can specify a priority of 1 through 15.

**imsi** *imsi*—(Optional) Display the subscriber information for the specified International Mobile Subscriber Identity (IMSI).

**msisdn** *msisdn*—(Optional) Display the subscriber information for the specified mobile station ISDN (MSISDN) number.

**pdn-type (ipv4 | ipv4-v6 | ipv6)**—(Optional) Display the subscriber information for the specified Packet Data Network (PDN) type or session type. You can specify the following PDN or session types:

- **ipv4**—Subscribers with only IPv4 sessions.
- **ipv4-v6**—Subscribers with both IPv4 and IPv6 sessions.
- **ipv6**—Subscribers with only IPv6 sessions.

**peer** *peer*—(Optional) Display the subscriber information for the specified peer IP address.

**pic-slot *pic-slot***—(Optional) Display the subscriber information for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**qci *qci***—(Optional) Display the subscriber information for the specified QoS Class Identifier (QCI).

**roaming-status (home | roamer | visitor)**—(Optional) Display the subscriber information for the specified roaming status.

**Required Privilege Level** view

**Related Documentation**
- clear unified-edge sgw subscribers on page 1388
- show unified-edge sgw subscribers charging on page 1428

**List of Sample Output**
show unified-edge sgw subscribers brief on page 1426
show unified-edge sgw subscribers extensive on page 1427

**Output Fields** Table 143 on page 1422 lists the output fields for the **show unified-edge sgw subscribers** command. Output fields are listed in the approximate order in which they appear.

Table 143: show unified-edge sgw subscribers Output Fields

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Gateway** | Name of the S-GW. | All levels |
| **IMSI** | IMSI of the subscriber's user equipment. | **brief** |
| **MSISDN** | MSISDN number of the subscriber's user equipment. | **brief** |
| **ACS Peer Ctrl Address** | Control plane IP address of the access peer. | **brief** |
| **S5 Peer Ctrl Address** | Control plane IP address of the peer on the S5 interface. | **brief** |
| **APN** | Access point name (APN) to which the subscriber is attached. | **brief** |
| Subscriber Information: | | |
| **UE:** | | |
| **IMSI** | IMSI of the subscriber's user equipment. | **extensive** |
| **IMEI** | International Mobile Station Equipment Identity (IMEI) of the subscriber's user equipment. | **extensive** |
| **MSISDN** | MSISDN number of the subscriber's user equipment. | **extensive** |

Table 143: show unified-edge sgw subscribers Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Time Zone** | Time zone to which the subscriber's Mobile Station (MS) or user equipment belongs. | **extensive** |
| **DST** | Daylight saving time applicable within the time zone. | **extensive** |
| **RAT Type** | Type of Radio Access Technology (RAT) used. | **extensive** |
| User Location Info: | | |
| **MCC** | Mobile country code (MCC) of the subscriber. | **extensive** |
| **MNC** | Mobile network code (MNC) of the subscriber. | **extensive** |
| **LAC** | Location area code (LAC) of the subscriber. | **extensive** |
| **CI** | Cell Identity (CI) of the subscriber. | **extensive** |
| **SAC** | Service area code (SAC) of the subscriber. | **extensive** |
| **RAC** | Routing area code (RAC) of the subscriber. | **extensive** |
| **TAC** | Tracking area code (TAC) of the subscriber. | **extensive** |
| **ECI** | E-UTRAN Cell identifier (ECI) of the subscriber. | **extensive** |
| **SGW Control IP** | Control plane IP address of the S-GW on the S11 or S4 interfaces. | |
| **SGW Control TEID** | Control plane Tunnel Endpoint Identifier (TEID) of the S-GW on the S11 or S4 interfaces. | **extensive** |
| **MME Control IP** | Control plane IP address of the Mobility Management Entity (MME) on the S11 interface. | **extensive** |
| **MME Control TEID** | Control plane TEID of the MME on the S11 interface. | **extensive** |
| **ISR** | Idle mode signaling reduction (enabled or disabled). If this is enabled, then both the MME and SGSN information is displayed in the command output. If it is disabled, then the either the MME or SGSN information is displayed. | **extensive** |
| **Active Peer** | Indicates whether the MME or the SGSN is actively sending control messages to S-GW. | **extensive** |
| **State** | State of the subscriber: idle, active, or suspended. | **extensive** |
| **PDN Session:** | | |
| **APN name** | Access point name for the Packet Data Network (PDN) session. | **extensive** |

Table 143: show unified-edge sgw subscribers Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **IPv4 Address** | IPV4 address of the subscriber. | **extensive** |
| **IPv6 Address** | IPV6 address of the subscriber. | **extensive** |
| **SGW S5 C IP** | IP address of the S5 GTP-C tunnel on the S-GW side to which the PDN Gateway (P-GW) will send control messages for the subscriber. | **extensive** |
| **PGW S5 C IP** | IP address of the S5 GTP-C tunnel on the P-GW side to which the S-GW will send control messages for the subscriber. | **extensive** |
| **SGW S5 C TEID** | TEID of the S5 GTP-C tunnel on the S-GW side. The P-GW sends this TEID in the GTP header in all control messages to the S-GW. | **extensive** |
| **PGW S5 C TEID** | TEID of the S5 GTP-C tunnel on the P-GW side. The S-GW sends this TEID in the GTP header in all control messages to the P-GW. | **extensive** |
| **PGW CSID** | Connection Set Identifier (CSID) allocated by the P-GW. | **extensive** |
| **MME CSID** | Connection Set Identifier (CSID) allocated by the Mobile Management Entity (MME). | **extensive** |
| **Selection mode** | APN selection mode provided by the SGSN or S-GW in the Create Request message. | **extensive** |
| **Session PIC** | FPC and PIC slots for the session PIC on which the subscriber control session is present. | **extensive** |
| **PFE** | FPC and PIC slots for the Packet Forwarding Engine for the PDP session. | **extensive** |
| **Session State** | State of the subscriber session on the signaling plane. | **extensive** |
| **Session Duration** | Duration of the PDP session. | **detail**<br>**extensive** |
| **Roaming Status** | Roaming status of the subscriber; that is, whether the subscriber is a visitor, home subscriber, or a roamer. | **detail**<br>**extensive** |
| **Serving Network** | The following information about the network that is serving the subscriber (that the subscriber is attached to) is displayed:<br>• **MCC**—Mobile country code of the network.<br>• **MNC**—Mobile network code of the network. | **extensive** |
| **Direct Tunnel** | Status of the GTPv1 direct tunnel: enabled or disabled. | **extensive** |
| Bearer: | | |

Table 143: show unified-edge sgw subscribers Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **NSAPI/EBI** | Network Service Access Point Identifier (NSAPI) or the Evolved Packed System Bearer ID (EBI) for the session. | **extensive** |
| **SGW Access Data IP** | Data plane IP address of the S-GW on the S1u, S4, or S12 interface. | |
| **eNodeB/RNC Data IP** | Remote data plane IP address of the peer on the S1u, S4, or S12 interface. | **extensive** |
| **SGW Access Data TEID** | Data plane TEID of the S-GW on the S1u, S4, or S12 interface. | **extensive** |
| **eNodeB/RNC Data TEID** | Remote data plane TEID of the peer on the S1u, S4, or S12 interface. | **extensive** |
| **SGW S5/S8 Data IP** | IP address of the S-GW to which the P-GW sends the data packets for the bearer. | **extensive** |
| **PGW Data IP** | IP address of the P-GW to which the S-GW sends the data packets for the bearer. | **extensive** |
| **SGW S5/S8 Data TEID** | Data TEID allocated by the S-GW that identifies the data tunneling endpoint for all data packets coming in from the data peer. This is sent in the GTP header for all the data packets sent from the S-GW to the P-GW. | **extensive** |
| **PGW Data TEID** | Data TEID allocated by the P-GW that identifies the data tunneling endpoint for all data packets coming in from the data peer. This is sent in the GTP header for all the data packets sent from the P-GW to the S-GW. | **extensive** |
| **Bearer State** | Represents the state of the subscriber in the forwarding or data plane. This parameter is used internally by the P-GW. | **extensive** |
| **Idle Timeout** | Idle timeout for the session, in minutes. | **extensive** |
| **QoS Parameters** | The following parameters for the user equipment related to quality of service (QoS) are displayed:<br>• **QCI**—QoS Class Identifier.<br>• **ARP: (PL/PVI/PCI)**—The following parameters related to ARP are displayed:<br>  ◦ Priority level (PL).<br>  ◦ Preemption Vulnerability Indicator (PVI)<br>  ◦ Preemption Capability Indicator (PCI)<br>• **Fwd Class**—Forwarding class<br>• **Loss Priority**—Packet loss priority | **extensive** |

Table 143: show unified-edge sgw subscribers Output Fields *(continued)*

| Field Name | Field Description | Level of Output |
|---|---|---|
| **Charging information** | The following information related to charging is displayed:<br>• **Charging ID**—Charging ID for the session. The charging ID is the unique bearer identity sent in accounting messages and in Charging Data Records (CDRs).<br>• **Profile ID**—ID of the charging profile associated with the bearer.<br>• **State**—(extensive only) Current charging state for the bearer.<br>• **Previous State**—(extensive only) Previous charging state for the bearer.<br>• **Profile selection criteria**—(extensive only) Selection source (home, visitor, roamer, and default) for the charging profile for the bearer.<br>• **Offline charging information**—(extensive only) The following details of offline charging information are displayed if offline charging is enabled; if not, an indication that offline charging is disabled is displayed:<br>  ◦ **Current service data container sequence number**—Sequence number of the current local service data container.<br>  ◦ **Current partial record sequence number**—Sequence number of the current partial record CDR.<br>  ◦ **Number of CDRs closed**—Number of closed CDRs generated.<br>  ◦ **Number of containers closed**—Number of containers closed. | **extensive** |
| **Rating group information** | The following information related to the rating group is displayed:<br>• **Rating group**—Default rating group associated with the bearer.<br>• **Service ID**—Service identifier of the rating group.<br>• **Action ID**—Action identifier of the rating group.<br>• **Trigger profile**—Trigger profile number associated with the rating group.<br>• **Change condition bitmask**—Rating group trigger change condition bitmask.<br>• **Action-id-bitmask**—Charging action ID bitmask.<br>• **Signal bitmask**—Rating group trigger signal condition bitmask.<br>• **Last signal bitmask**—Previous rating group trigger signal condition bitmask.<br>• **Details**—Trigger flag information.<br>• **Last statistics info**—(extensive only) The following information about the last statistics collected is displayed if statistics were collected; if not, an indication that no statistics were collected is displayed:<br>  ◦ **Collection time**—Time when the last control plane recorded statistics for the subscriber.<br>  ◦ **Uplink packets**—Number of packets handled in the uplink direction.<br>  ◦ **Downlink packets**—Number of packets handled in the downlink direction.<br>  ◦ **Uplink bytes**—Number of bytes handled in the uplink direction.<br>  ◦ **Downlink bytes**—Number of bytes handled in the downlink direction. | **extensive** |

## Sample Output

**show unified-edge sgw subscribers brief**

```
user@host> show unified-edge sgw subscribers brief
Gateway: SGW
                IMSI          MSISDN      ACS PEER CTRL    S5 PEER CTRL          APN

                                                Address         Address
    111111111123457      1111111112         200.7.1.2       200.7.0.2
```

```
jnpr-bangalore_scale
```

### show unified-edge sgw subscribers extensive

```
user@host> show unified-edge sgw subscribers extensive
Gateway: SGW

Subscriber Information:
  UE:
    IMSI: 123567213123256              IMEI: 1122334455667788
    MSISDN: 1926737745                 Time Zone: GMT     DST: None
    RAT Type: E-UTRAN
    User Location Info:
      MCC: 450     MNC: 51
      LAC: 0x37 CI: 0x43    SAC: 0x0  RAC: 0x0  TAC: 0x0  ECI: 0x0
    SGW Control IP: 200.1.6.1          SGW Control TEID: 0x15000800
    MME Control IP: 200.1.4.2          MME Control TEID: 0xbc615c
    ISR: Disabled                      Active Peer: MME
    UE State: Active
  PDN Session:
    APN name: jnpr-sunnyvale.mnc012.mcc345.gprs
    IPv4 Address: 20.20.44.1           IPv6 Address: None
    SGW S5 C IP: 200.1.6.1             PGW S5 C IP: 200.1.5.1
    SGW S5 C TEID: 0x15002c00          PGW S5 C TEID: 0x25000000
    PGW CSID: 15381                    MME CSID: 0
    Selection mode: MS or network provided APN, subscription verified

    Session PIC: 1 /0  (FPC/PIC)       PFE: 2 /0  (FPC/PIC)
    Session State: Established         Session Duration: 4:17
    Roaming Status: Roamer             Serving network: MCC: 123  MNC: 567
    Direct Tunnel: Disabled
  Bearer:
    NSAPI/EBI: 5
    SGW Access Data IP: 200.1.6.1      eNodeB/RNC Data IP: 200.1.4.2
    SGW Access Data TEID: 0x14150800   eNodeB/RNC Data TEID: 0xbc615f
    SGW S5/S8 Data IP: 200.1.6.1       PGW Data IP: 200.1.5.1
    SGW S5/S8 Data TEID: 0x14250400    PGW Data TEID: 0x3c150000
    Bearer State: Established
    Idle Timeout: 0
    QoS Parameters :
       QCI: 5                          ARP: 1 /0 /0   (PL/PVI/PCI)
       Fwd Class   : None              Loss Priority : None
    Charging information:
       Charging ID: 0x25000000
       Profile ID: 0
       State: Init                     Previous State: Init
       Profile selection criteria: None
    Offline charging information: Disabled
    Rating group information:
       Rating group: 0 Service id: 0
       Action ID: 0x0                     Trigger profile: 0
       Change condition bitmask: 0x0      Action-id-bitmask: 0x0
       Signal bitmask: 0x0                Last signal bitmask: 0x0
       Last statistics info:
         Collection time: None collected
```

## show unified-edge sgw subscribers charging

**Syntax**

**show unified-edge sgw subscribers charging gateway *gateway***
**<brief | detail | extensive>**
**<charging-profile *charging-profile*>**
**<fpc-slot *fpc-slot*>**
**<pic-slot *pic-slot*>**
**<transport-profile *transport-profile*>**

**Release Information**

Command introduced in Junos OS Mobility Release 11.4W.

**Description**

Display the subscribers matching the specified charging profile or transport profile on the specified Serving Gateway (S-GW).

**Options**

**gateway *gateway***—Display the subscriber information for the specified gateway name.

**brief | detail | extensive** —(Optional) Display the specified level of output.

**charging-profile *charging-profile***—(Optional) Display the subscribers matching the specified charging profile name.

NOTE: You must specify either a charging profile or a transport profile to execute this command.

**fpc-slot *fpc-slot***—(Optional) Display the subscriber information for the specified FPC slot number.

**pic-slot *pic-slot***—(Optional) Display the subscriber information for the specified PIC slot number. You must first specify an FPC slot number before specifying the PIC slot number.

**transport-profile *transport-profile***—(Optional) Display the subscribers matching the specified transport profile name.

NOTE: You must specify either a charging profile or a transport profile to execute this command.

**Required Privilege Level**

view

**Related Documentation**

- clear unified-edge sgw subscribers charging on page 1390
- show unified-edge sgw subscribers on page 1421

**List of Sample Output**

show unified-edge sgw subscribers charging gateway SGW charging-profile cp1 brief on page 1429

show unified-edge sgw subscribers charging gateway SGW charging-profile cp1 detail on page 1429
show unified-edge sgw subscribers charging gateway SGW charging-profile cp1 extensive on page 1430

**Output Fields** Refer to the output fields for the show unified-edge sgw subscribers command, which is the same as the output fields for the **show unified-edge sgw subscribers charging** command.

## Sample Output

**show unified-edge sgw subscribers charging gateway SGW charging-profile cp1 brief**

```
user@host> show unified-edge sgw subscribers charging gateway SGW charging-profile cp1 brief
            IMSI          MSISDN      ACS PEER CTRL    S5 PEER CTRL          APN

                                          Address         Address
 123213213123568      1926738057          79.1.1.3     114.11.11.2 internet123
```

**show unified-edge sgw subscribers charging gateway SGW charging-profile cp1 detail**

```
user@host> show unified-edge sgw subscribers charging gateway SGW charging-profile cp1
detail
 Subscriber information:

  UE:
     IMSI:        123213213123568     IMEI: 1122334455667791
     MSISDN:      1926738057          MS-Timezone: GMT     (DST): None     User
location info:
     MCC:       300                   MNC:      400
     LAC: 0x3e8    CI: 0xc8    SAC: 0x0     RAC: 0x0    TAC: 0x0     ECI: 0x0
     RAT Type:        E-UTRAN              Status: Visitor
     SGW Control IP:  11.11.11.11          SGW Control TEID:  0xd001000
     MME Control IP:  79.1.1.3             MME Control TEID:  0x103
     ISR:             Disabled             Active Peer:       MME
     Serving network: MCC: 123   MNC :567
     State:   ACTIVE
    PDN session information:
  PDN session:
     APN name:    internet123.mnc567.mcc123.gprs
     V4 Addr:     16.16.4.6            V6 Address:  -
     Direct Tunnel: Disabled           Up time:        8:16:28
     SGW S5 C IP:   11.11.11.11        PGW S5 C IP:    114.11.11.2
     SGW S5 C TEID: 0xd001c00          PGW S5 C TEID:  0x3ee
     PGW CSID:    100                  MME CSID:       0
     Addr scheme: None                 Selection mode: MS or network provided
APN, subscription verified
     SPIC:        5 /0  (FPC/PIC)      APFE:           1 /0  (FPC/PIC)
     State:       SgwSessionEstablished
    APN AMBR :
     AMBR-DL:    22         kbps     AMBR-UL:     88        kbps
    Bearer        :
     NSAPI/EBI      :5
     SGW ACS IP     :11.11.11.11         ACS PEER IP   :79.1.1.3
     SGW ACS TEID   :0x150400            ACS PEER TEID :0x104
     SGW S5 U IP    :11.11.11.11         PGW S5 U IP   :114.11.11.2
     SGW S5 U TEID  :0x250400            PGW S5 U TEID :0x3ef
     Charging ID    :0x3ef
     State          :SgwBearerEstablished
     Idle count     :0
     Idle Timeout   :0   min(0   -0,0)
    QoS Parameters :
```

```
     QCI         :5                    ARP         :1 /0 /0   (PL/PVI/PCI)
     Fwd Class   :af2                Loss Priority :high
    Charging information: Profile ID: 1   Profile name: p_juniper
       State: Ready                       Previous State: Ga
       Details: Offline bearer
    Rating group information:
       Rating group: 0 Service id: 0
       Details: Bearer trigger, Offline RG
```

**show unified-edge sgw subscribers charging gateway SGW charging-profile cp1 extensive**

```
user@host> show unified-edge sgw subscribers charging gateway SGW charging-profile cp1
extensive
Gateway: SGW
Subscriber information:

  UE:
     IMSI:        111222330000001     IMEI: -
     MSISDN:      444550000001        MS-Timezone: GMT     (DST): None     User
location info:
     MCC:       234                    MNC:      567
     LAC: 0x0     CI: 0x0     SAC: 0x0     RAC: 0x0   TAC: 0x4321  ECI: 0x1234568

     RAT Type:        E-UTRAN               Status: Visitor
     SGW Control IP:  11.11.11.11           SGW Control TEID:  0x5e001000

     MME Control IP:  50.50.50.1            MME Control TEID:  0x1

     ISR:             Disabled              Active Peer:       MME
     Serving network: MCC: 123   MNC :456
     State:   ACTIVE
    PDN session information:
  PDN session:
     APN name:    internet123.mnc456.mcc123.gprs

     V4 Addr:     11.0.0.2              V6 Address:  -

     Direct Tunnel: Disabled           Up time:        1:30
     SGW S5 C IP:   11.11.11.11        PGW S5 C IP:    50.50.50.50
     SGW S5 C TEID: 0x5e001c00         PGW S5 C TEID:  0x2
     PGW CSID:    0                    MME CSID:       0
     Addr scheme: None                 Selection mode: MS or network provided
APN, subscription verified
     SPIC:        3 /0  (FPC/PIC)      APFE:           2 /0  (FPC/PIC)
     State:       SgwSessionEstablished
    APN AMBR :
     AMBR-DL:    2000       kbps     AMBR-UL:     2000      kbps
    Bearer        :
     NSAPI/EBI      :5
     SGW ACS IP     :11.11.11.11         ACS PEER IP   :50.50.50.3
     SGW ACS TEID   :0xc8160401          ACS PEER TEID :0x271b
     SGW S5 U IP    :11.11.11.11         PGW S5 U IP   :50.50.50.50
     SGW S5 U TEID  :0xc8260401          PGW S5 U TEID :0x2712
     Charging ID    :0x2
     State          :SgwBearerEstablished
     Idle count     :3
     Idle Timeout   :0   min(0   -0,0)
    QoS Parameters :
     QCI         :5                    ARP         :1 /0 /0   (PL/PVI/PCI)
     Fwd Class   : None             Loss Priority : None
    Charging information: Profile ID: 1   Profile name: CP1
       State: Ready                       Previous State: Ga
```

```
   Profile selection criteria: Static default
   Details: Offline bearer
Offline charging information:
   Current service data container sequence number: -
   Current partial record sequence number        : 4
   Number of CDRs closed                         : 4
   Number of containers closed                   : 5
Rating group information:
   Rating group: 0 Service id: 0
   Action ID: 0xb000401              Trigger profile: 0
   Change condition bitmask: 0x0     Action-id-bitmask: 0x0
   Signal bitmask: 0x0               Last signal bitmask: 0x0
   Details: Bearer trigger, Offline RG
     Collection time: Thu Jan  1 01:41:45 1970
     Uplink packets: 14                Downlink packets : 18
     Uplink bytes: 1400                Downlink bytes : 1800
```

## show unified-edge sgw system interfaces service-mode

**Syntax** show unified-edge sgw system interfaces service-mode
<brief | detail>
<gateway-name *gateway-name*>

**Release Information** Command introduced in Junos OS Mobility Release 11.4W.

**Description** Display the service mode information for the interfaces on one or more Serving Gateways (S-GWs). If an S-GW is not specified, then information for all S-GWs is displayed.

**Options** **none**—(Same as brief) Display service mode information for one or more S-GWs.

**brief | detail**—(Optional) Display the specified level of output.

**gateway-name *gateway-name***—(Optional) Display service mode information for the specified gateway.

**Required Privilege Level** view

**Related Documentation**
- show unified-edge sgw system interfaces on page 1144

**List of Sample Output**
show unified-edge sgw system interfaces service-mode brief on page 1433
show unified-edge sgw system interfaces service-mode detail on page 1433

**Output Fields** Table 144 on page 1432 lists the output fields for the **show unified-edge sgw system interfaces service-mode** command. Output fields are listed in the approximate order in which they appear.

### Table 144: show unified-edge sgw system interfaces service-mode

| Field Name | Field Description |
|---|---|
| **Interface Name** | Name of the interface for which the service mode information is displayed:<br>• Aggregated multiservices; for example, **ams0**<br>• Aggregated Packet Forwarding Engine; for example, **apfe1**<br>• Multiservices; for example, **ms-1/0/0** |
| **Gateway Name** | Name of the S-GW. |
| **Service Mode** | Service mode for the gateway. The following service modes are possible:<br>• Operational—Gateway is in operational mode.<br>• Maintenance—Gateway is in maintenance mode.<br>• **MM Active Phase**—In this mode, you can make changes to all of the configuration options.<br>• **MM In/Out Phase**—In this mode, you can only make changes to the configuration options for the non-maintenance-mode attributes. |

## Sample Output

**show unified-edge sgw system interfaces service-mode brief**

```
user@host> show unified-edge sgw system interfaces service-mode brief
Maintenance Mode
    MM Active Phase - System is ready to accept configuration changes for all
                      attributes of this object and its sub-hierarchies.
    MM In/Out Phase - System is ready to accept configuration changes only for
                      non-maintenance mode attributes of this object and
                      its sub-hierarchies.

Interface Name     Gateway Name                    Service Mode

pfe-2/2/0          SGW                             Operational
ams0               SGW                             Operational
```

**show unified-edge sgw system interfaces service-mode detail**

```
user@host> show unified-edge sgw system interfaces service-mode detail
Service Mode Status
Interface Name  : pfe-2/2/0
Gateway Name    : SGW
Service Mode    : Operational
Service Mode Status
Interface Name  : ams0
Gateway Name    : SGW
Service Mode    : Operational
```

PART 13

# Index

# Index

## Symbols



## A

## B

## C

## D

## E

## F

## G

## H



## I

## M

## N

## Q

## R

## S

## T

## U



## V



## W

# Index of Statements and Commands

## D

## H



## I



## L



## M

## N



## O



## P

## Q



## R

## S

## T

## U



## V



## W