JUNIPER NETWORKS

Junos® OS

Subscriber Access Configuration Guide

Release

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Junos® OS Subscriber Access Configuration Guide
Release 10.4

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Juniper Networks hardware and software products are Year 2000 compliant. The 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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About This Guide

This preface provides the following guidelines for using the *Junos® OS Subscriber Access 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.*

To obtain the most current version of all Juniper Networks® technical documentation, see the product documentation page on the Juniper Networks website at http://www.juniper.net/techpubs/.

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 subscriber access management features of the Junos OS and describes how to configure and manage remote subscriber access on the routing 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 network administrators who are configuring and monitoring Juniper Networks MX Series Ethernet Services Routers.

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 Routing Platforms

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

- MX Series routers

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 liii 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 liii 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: user@host> **configure**
`Fixed-width text like this`	Represents output that appears on the terminal screen.	`user@host>` **show chassis alarms** `No alarms currently active`
Italic text like this	• Introduces important new terms. • Identifies book names. • Identifies RFC and Internet draft titles.	• A policy *term* is a named structure that defines match conditions and actions. • *Junos System Basics Configuration Guide* • 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: [edit] root@# **set system domain-name** *domain-name*
Text like this	Represents names of configuration statements, commands, files, and directories; IP addresses; 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. • 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** (***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]
		routing-options {
		  static {
		  route default {
		  nexthop *address*;
		  retain;
		  }
		  }
		}

; (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**. • 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**.

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

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- 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.

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- 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

Managing Access Networks

CHAPTER 1

Subscriber Access Overview

Subscriber Access Overview

The Juniper Networks Junos subscriber access feature provides subscriber access, authentication, and service creation, activation, and deactivation. You can also collect accounting information and statistics for subscriber service sessions.

The subscriber access feature supports both CLI and AAA-based configuration (such as RADIUS) for subscribers. Access and services start when the router receives a message from a client (such as a DHCP discover message). For RADIUS clients, RADIUS Access-Accept messages and Change-of-Authorization-Request (CoA-Request) messages can create, modify, and delete subscriber sessions as well as activate and deactivate service sessions. You can use CLI commands to create a dynamic profile, which act as a template of user attributes.

A subscriber service is based on the combination of a defined dynamic profile and attributes configured through authentication. Dynamic profiles can include dynamic firewall filters, class of service (CoS) settings, and protocol (IGMP) settings that define access limits for subscribers and the scope of a service granted to the subscriber once access is obtained.

The subscriber access feature provides the following convenience and flexibility to service providers and subscribers:

- Service providers can separate services and access technology and eliminate unprofitable flat-rate billing. They gain the ability to efficiently design, manage, and deliver services that subscribers want, and then bill subscribers based on connect time, bandwidth, and the actual service used.
- Subscribers benefit by gaining access to multiple simultaneous services. Depending on the service provider configuration, subscribers can dynamically connect to and disconnect from various services when they want and for however long they want. Subscribers can be billed based on the service level and usage, rather than being charged a set rate regardless of usage.

Subscriber Access Terms and Acronyms

Table 3 on page 4 defines terms and acronyms that are used in this discussion of subscriber access.

Table 3: Subscriber Access Terms and Acronyms

Term	Definition
AAA method for subscriber authentication	The AAA method that uses authentication (for example, including RADIUS VSAs in the Access-Accept packet) to verify a subscriber and activate a service when the subscriber logs in.
Dynamic profile	A template that defines a set of characteristics that are combined with authorization attributes and are dynamically assigned to static interfaces to provide dynamic subscriber access and services for broadband applications.
RADIUS CoA method	The method that uses RADIUS CoA-Request messages and VSAs to activate a service for a subscriber that is already logged in.
Subscriber access technology	The technology used by a subscriber to access services (for example, DHCP).

Related Documentation

- Subscriber Access Environment on page 4
- Subscriber Access Licensing Overview on page 6
- Subscriber Access Operation Flow on page 6
- Configuring Subscriber Access on page 9

Subscriber Access Environment

A subscriber access environment can include various components, including subscriber access technologies and authentication protocols.

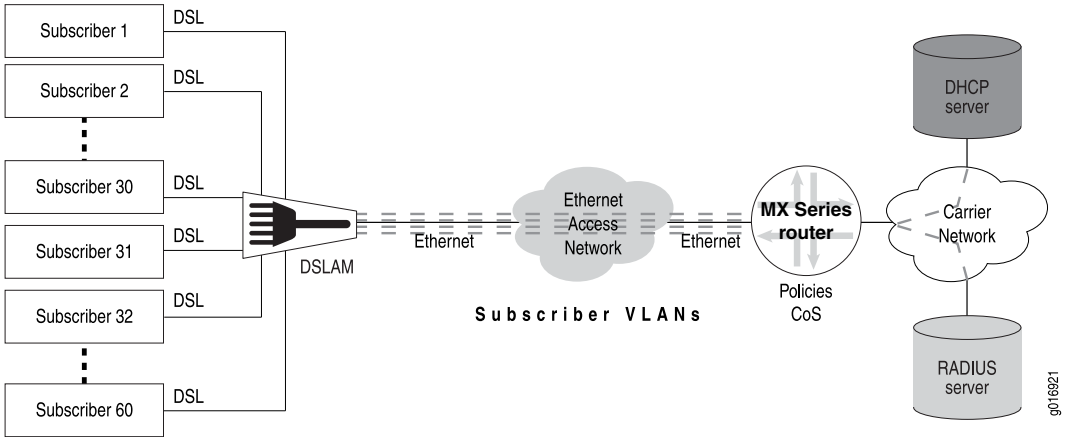
The subscriber access technologies include:

- Dynamic Host Configuration Protocol (DHCP) server
  - Local DHCP server
  - External DHCP server
- Point-to-Point Protocol (PPP)

The subscriber authentication protocols include the RADIUS server.

Figure 1 on page 5 shows an example of a basic subscriber access network.

Figure 1: Subscriber Access Network Example



Related Documentation

- Subscriber Access Overview on page 3

Relationship Between Subscribers and Interfaces in an Access Network

To the router, a subscriber is an authenticated user. This release supports configurations of only one subscriber per logical interface. However, a subscriber can be either an individual, authenticated client or a group of clients on a single, authenticated VLAN.

Related Documentation

- Subscriber Interface Overview on page 391

Subscriber Access Support Considerations

The subscriber access feature is limited to MX Series Ethernet Services Routers and the interfaces you can use when configuring dynamic profiles.

Platform Support

Even though many statements appear in the CLI for various other platforms, Juniper Networks supports subscriber access DHCP configuration on MX Series routers only. In addition, PPPoE configuration is currently supported on MX Series routers, M120 routers, and M320 routers.

Interface Support

You can use dynamic profiles to configure statically created interfaces and also to create and configure interfaces dynamically. Subscriber interfaces support IPv4 and IPv6 addressing.

To identify subscribers statically, you can reference a static VLAN interface in a dynamic profile. To identify subscribers dynamically, you create variables for demux interfaces that are dynamically created when subscribers log in.

The subscriber access feature supports the following device types:

- GE -- Gigabit Ethernet
- XE -- 10–Gigabit Ethernet
- AE -- Aggregated Ethernet

DPC Support

Certain subscriber management features require the use of specific dense port concentrators (DPCs) on the MX series router. For a list of the MX series DPCs and the features they support, see the *MX Series 3D Universal Edge Routers Line Card Guide*.

Related Documentation

- Relationship Between Subscribers and Interfaces in an Access Network on page 5
- Configuring Subscriber Access on page 9

Subscriber Access Licensing Overview

To enable some Juniper Networks Junos OS features or router scaling levels, you might have to purchase, install, and manage separate software license packs. The presence on the router of the appropriate software license keys (passwords) determines whether you can configure and use certain features or configure a feature to a predetermined scale.

Related Documentation

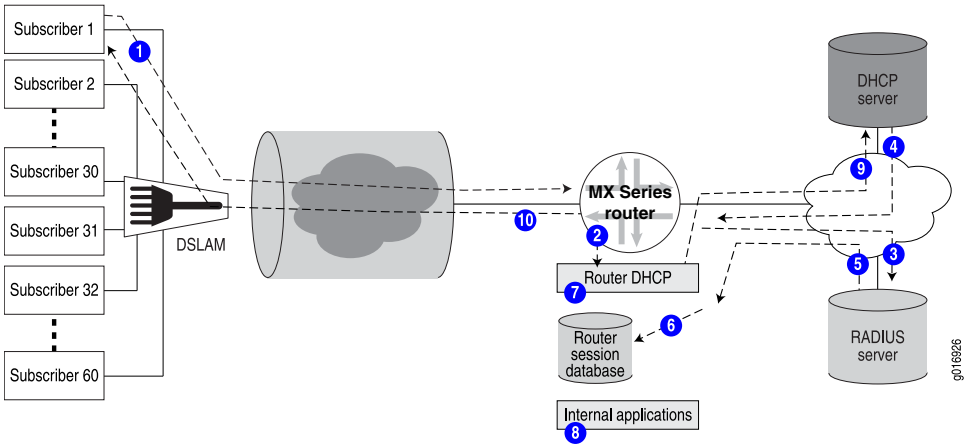
- For information about installing and managing Junos licenses, see the *Junos OS Installation and Upgrade Guide*

Subscriber Access Operation Flow

The subscriber access feature requires that a subscriber (for example, a DHCP client) send a discover message to the router interface to initialize dynamic configuration of that interface.

Figure 2 on page 7 shows the flow of operations that occur when the router is using DHCP relay to enable access for a subscriber.

Figure 2: Subscriber Access Operation Flow



The following general sequence occurs during access configuration for a DHCP client:

1. The client issues a DHCP discover message.
2. The router DHCP component recognizes the DHCP message and adds the client to the router session database.
3. If configured, the router issues an authorization request to the RADIUS server.
4. The DHCP server issues an IP address for the client. When the address is relayed, the address is added to the router session database.
5. RADIUS issues an authorization response to the router.
6. The router adds RADIUS authorization information to the router session database.
7. The router combines the dynamic profile with the RADIUS authorization information.
8. The router alerts all internal applications involved with the subscriber access (for example, routing protocols, dynamic firewall, and dynamic Class of Service).
9. The router passes the message through to the DHCP server.
10. The router DHCP component sends an acknowledgement back to the client.

The subscriber now has access to the network and the authorized service.

Related Documentation

- Subscriber Access Overview on page 3
- Configuring Subscriber Access on page 9

Activating Subscribers and Managing Services in an Access Network

The subscriber access feature uses dynamic profiles to activate subscribers and manage services.

A dynamic profile is a set of characteristics, defined in a template, that the router uses to provide dynamic subscriber access and services.

By using dynamic profiles you can:

- Define access for your network
- Define different service levels for subscribers
- Preprovision services that you can activate later

Using AAA-based login (RADIUS-based login or RADIUS CoA) you can:

- Provide subscribers with dynamic activation and deactivation based on service selection
- Provide greater flexibility and efficient management for a large number of subscribers and services

Components of a Dynamic Profile

You can use dynamic profiles to define various router components for subscriber access.

These components include the following:

- Dynamic firewall filters—Includes input and output filters to enforce rules that define whether to permit or deny packets that are transmitting an interface on the router. To apply dynamic firewall filters to the subscriber interface, you configure static input and output firewall filters and reference those filters in dynamic profiles.
- Dynamic Class of Service (CoS)—Includes CoS values that define a service for a subscriber. For example, you can configure the shaping rate for traffic in a video service by referencing CoS statements in a dynamic profile.
- Dynamic signaling protocol—Includes dynamic IGMP configuration for host to router signaling for IPv4 to support IP multicasting.

Router Predefined Variables Used by Dynamic Profiles

The router contains several predefined variables that enable dynamic association of interfaces and logical units to incoming subscriber requests. You must specify these predefined variables in certain statements within a dynamic profile. When a client accesses the router, the dynamic profile configuration replaces the predefined variable with the actual interface name or unit value for the interface the client is accessing.

The predefined variables include:

- $junos-interface-ifd-name—Replaced with the actual interface device name.
- $junos-underlying-interface-unit—Replaced with the actual logical unit number.

Related Documentation

- Dynamic Profiles Overview on page 325
- Subscriber Interface Overview on page 391

Configuring Subscriber Access

To configure subscriber access, perform the following tasks:

1. Configure the client access protocol.
   - Configure DHCP local server.

     See “Extended DHCP Local Server Overview” on page 84.
   - Configure DHCP relay.

     See “Extended DHCP Relay Agent Overview” on page 136.
   - Configure PPP.

     See the “Configuring Logical Interface Properties” and “Configuring Point-to-Point Protocol over Ethernet” chapters of the *Junos OS Network Interfaces Configuration Guide*.
2. Configure subscriber authentication, accounting, and addressing.
   a. Configure RADIUS:
      1. Specify the RADIUS servers.

         See “Specifying RADIUS Authentication and Accounting Servers for Subscriber Access” on page 27.
      2. Specify any optional server attributes.

         See “Configuring RADIUS Server Options for Subscriber Access” on page 29.
      3. (Optional) Configure the CoA feature for the RADIUS dynamic-request server to change or deactivate the service after login.

         See “Configuring RADIUS-Initiated Dynamic Request Support” on page 38.
      4. Configure subscriber accounting (RADIUS accounting).

         See “Configuring Per-Subscriber Session Accounting” on page 24.

   b. Configure addressing:
      - Configure address-assignment pools.

        See “Configuring Address-Assignment Pools” on page 56.
3. Create and manage dynamic profiles for access and service.
   a. Configure a basic dynamic profile.

      See “Configuring a Basic Dynamic Profile” on page 349.

      See “Example: Minimum PPPoE Dynamic Profile” on page 361
   b. Configure a dynamic profile for access.

      See “Configuring a Dynamic Profile for Client Access” on page 353.

c. Configure a dynamic profile for services.

   See “Configuring a Dynamic Profile for Various Levels of Services” on page 355.

d. Configure the static subscriber interfaces to be referenced in the dynamic profile.

   See “Configuring a Subscriber Interface with a Static VLAN Interface” on page 398.

e. Specify the interface-name and unit variables that the router uses to dynamically associate to a subscriber’s incoming interface.

   See “Associating Dynamic Profiles with Statically Created Interfaces” on page 399.

f. Add, modify, or delete dynamic profile values to manage subscriber access and services.

   See “Modifying Dynamic Profiles” on page 356.

The router dynamically activates or modifies the subscriber service using the RADIUS configuration.

- When the subscriber logs in, the router dynamically activates the service.

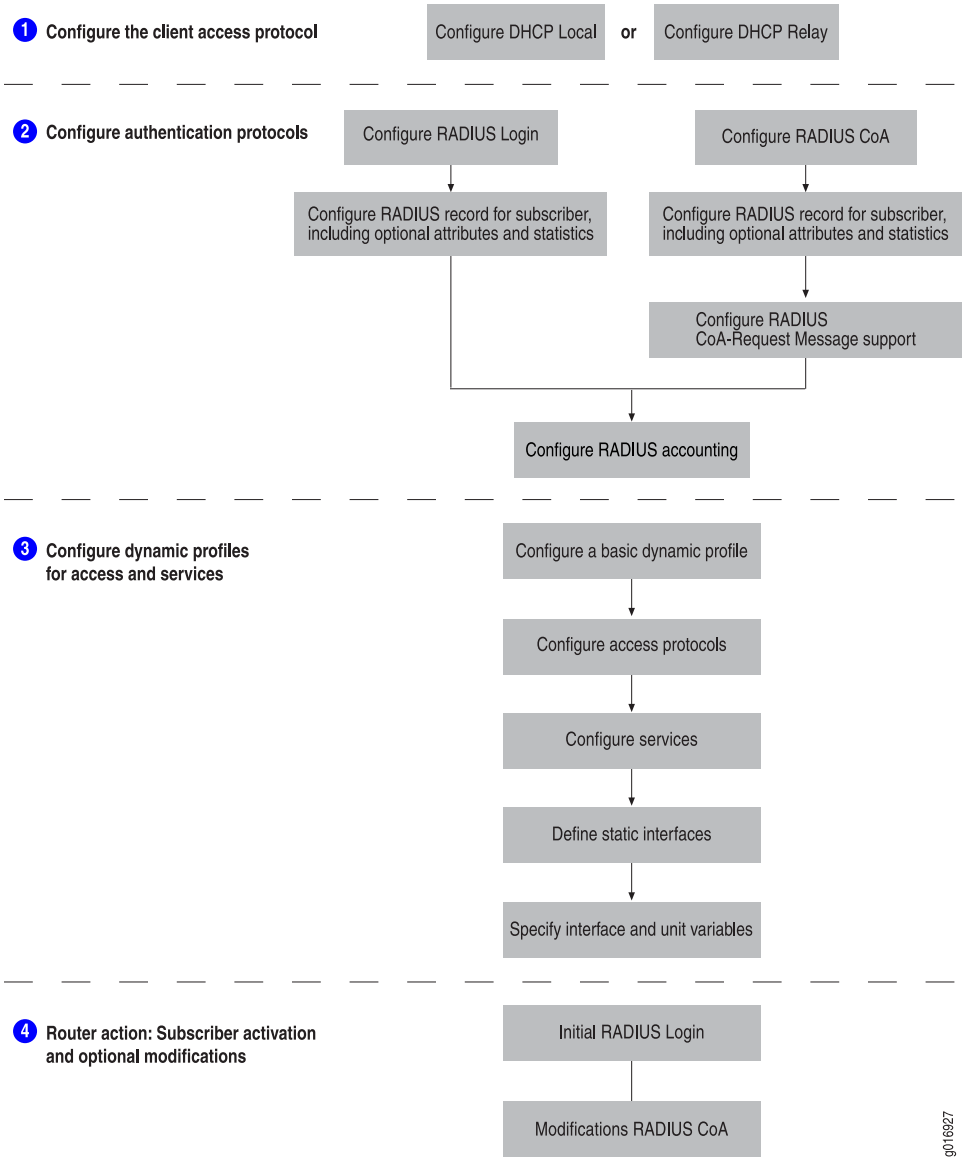
  See “Dynamic Service Activation During Login Overview” on page 35.

- If RADIUS CoA has been configured, the router can dynamically modify the service for a subscriber.

  See “RADIUS-Initiated Change of Authorization (CoA) Overview” on page 35.

Figure 3 on page 11 shows the configuration sequence you perform for DHCP-based subscriber access. It also shows the dynamic configuration performed by the router.

Figure 3: Subscriber Access Configuration Workflow



Related Documentation

- Subscriber Access Overview on page 3
- Subscriber Access Support Considerations on page 5

Collecting Subscriber Access Logs Before Contacting Juniper Technical Support

Problem When you experience a subscriber access problem in your network, we recommend that you collect certain logs before you contact Juniper Technical Support. This topic shows you the most useful logs for a variety of network implementations. In addition to the relevant log information, you must also collect standard troubleshooting information and send it to Juniper Technical Support in your request for assistance.

Solution To collect standard troubleshooting information:

- Redirect the command output to a file.

  user@host> **request support information | save rsi-1**

To configure logging to assist Juniper Technical Support:

1. Review the following blocks of statements to determine which apply to your configuration.
2. Copy the relevant statements into a text file and modify the log filenames as you wish.
3. Copy the statements from the text file and paste them into the CLI on your router to configure logging.
4. Commit the logging configuration to begin collecting information.

NOTE: The maximum file size for DHCP local server and DHCP relay log files is 1 GB. The maximum number of log files for DHCP local-server and DHCP relay is 1000.

BEST PRACTICE: Enable these logs only to collect information when troubleshooting specific problems. Enabling these logs during normal operations can result in reduced system performance.

```
[edit]
set system syslog archive size 100m files 25

set system auto-configuration traceoptions file filename
set system auto-configuration traceoptions file filename size 100m files 25

set protocols ppp-service traceoptions file filename size 100m files 25
set protocols ppp-service traceoptions level all
set protocols ppp-service traceoptions flag all

set protocols ppp traceoptions file filename size 100m files 25
set protocols ppp traceoptions level all
set protocols ppp traceoptions flag all
set protocols ppp monitor-session all

set interfaces pp0 traceoptions flag all

set demux traceoptions file filename size 100m files 25
set demux traceoptions flag all

set system services dhcp-local-server traceoptions file filename
set system services dhcp-local-server traceoptions file size 100m
set system services dhcp-local-server traceoptions file files 25
set system services dhcp-local-server traceoptions flag auth
set system services dhcp-local-server traceoptions flag database
set system services dhcp-local-server traceoptions flag fwd
set system services dhcp-local-server traceoptions flag general
set system services dhcp-local-server traceoptions flag ha
```



```
set system services dhcp-local-server traceoptions flag interface
set system services dhcp-local-server traceoptions flag io
set system services dhcp-local-server traceoptions flag packet
set system services dhcp-local-server traceoptions flag packet-option
set system services dhcp-local-server traceoptions flag profile
set system services dhcp-local-server traceoptions flag rpd
set system services dhcp-local-server traceoptions flag rtsock
set system services dhcp-local-server traceoptions flag session-db
set system services dhcp-local-server traceoptions flag state
set system services dhcp-local-server traceoptions flag ui

set forwarding-options dhcp-relay traceoptions file filename
set forwarding-options dhcp-relay traceoptions file size 100m
set forwarding-options dhcp-relay traceoptions file files 25
set forwarding-options dhcp-relay traceoptions flag auth
set forwarding-options dhcp-relay traceoptions flag database
set forwarding-options dhcp-relay traceoptions flag fwd
set forwarding-options dhcp-relay traceoptions flag general
set forwarding-options dhcp-relay traceoptions flag ha
set forwarding-options dhcp-relay traceoptions flag interface
set forwarding-options dhcp-relay traceoptions flag io
set forwarding-options dhcp-relay traceoptions flag packet
set forwarding-options dhcp-relay traceoptions flag packet-option
set forwarding-options dhcp-relay traceoptions flag profile
set forwarding-options dhcp-relay traceoptions flag rpd
set forwarding-options dhcp-relay traceoptions flag rtsock
set forwarding-options dhcp-relay traceoptions flag session-db
set forwarding-options dhcp-relay traceoptions flag state
set forwarding-options dhcp-relay traceoptions flag ui

set class-of-service traceoptions file filename
set class-of-service traceoptions file size 100m
set class-of-service traceoptions flag all
set class-of-service traceoptions file files 25

set routing-options traceoptions file filename
set routing-options traceoptions file size 100m
set routing-options traceoptions flag all
set routing-options traceoptions flag state
set routing-options traceoptions flag general
set routing-options traceoptions flag route
set routing-options traceoptions flag policy
set routing-options traceoptions flag normal
set routing-options traceoptions flag graceful-restart
set routing-options traceoptions flag config-internal
set routing-options traceoptions flag parse
set routing-options traceoptions flag condition-manager
set routing-options traceoptions file files 25

set interfaces traceoptions file filename
set interfaces traceoptions file size 100m
set interfaces traceoptions flag all
set interfaces traceoptions file files 25

set system processes general-authentication-service traceoptions file filename
set system processes general-authentication-service traceoptions file size 100m
set system processes general-authentication-service traceoptions flag all
set system processes general-authentication-service traceoptions file files 25
```


PART 2

AAA Service Framework for Subscriber Access

CHAPTER 2

Configuring the AAA Service Framework for Subscriber Access

AAA Service Framework Overview

The authentication, authorization, and accounting (AAA) Service Framework provides a single point of contact for all the authentication, authorization, accounting, address assignment, and dynamic request services that the router supports for network access. The framework supports authentication and authorization through external servers, such as RADIUS. The framework also supports accounting and dynamic-request change of authorization (CoA) and disconnect operations through external servers, and address assignment through a combination of local address-assignment pools and RADIUS.

When interacting with external back-end RADIUS servers, the AAA Service Framework supports standard RADIUS attributes and Juniper Networks vendor specific attributes (VSAs). The AAA Service Framework also includes an integrated RADIUS client that is compatible with RADIUS servers that conform to RFC-2865, *Remote Authentication Dial In User Service (RADIUS)*, RFC-2866, *RADIUS Accounting*, and RFC-3576, *Dynamic Authorization Extensions to Remote Authentication Dial In User Service (RADIUS)*, and which can initiate requests.

You create the following types of configurations to manage subscriber access.

- Authentication—Authentication parameters defined in the access profile determine the authentication component of the AAA processing. For example, subscribers can be authenticated using an external authentication service such as RADIUS.
- Accounting—Accounting parameters in the access profile specify the accounting part of the AAA processing. For example, the parameters determine how the router collects and uses subscriber statistics. You can also configure AAA to enable the router to collect statistics on a per-service session basis for subscribers.
- RADIUS-initiated dynamic requests—A list of authentication server IP addresses in the access profile specify the RADIUS servers that can initiate dynamic requests to the router. Dynamic requests include CoA requests, which specify VSA modifications and service changes, and disconnect requests, which terminate subscriber sessions. The list of authentication servers also provide RADIUS-based dynamic service activation and deactivation during subscriber login.
- Address assignment—The AAA Service Framework assigns addresses to subscribers based on the configuration of local address-assignment pools. For example, the AAA framework collaborates with RADIUS servers to assign addresses from the specified pools.
- Subscriber secure policy—RADIUS VSAs and attributes provide RADIUS-initiated traffic mirroring on a per-subscriber basis.

Related Documentation

- Configuring Router or Switch Interaction with RADIUS Servers on page 19

- RADIUS Acct-On and Acct-Off Messages on page 21
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
- Address-Assignment Pools Overview on page 55
- RADIUS Accounting Statistics for Subscriber Access Overview on page 22
- Using RADIUS Dynamic Requests for Subscriber Access Management on page 34
- Subscriber Secure Policy Overview on page 557

Configuring Router or Switch Interaction with RADIUS Servers

You specify the RADIUS servers that the router or switch can use and you configure how the router or switch interacts with the servers. You can configure the router or switch to use multiple RADIUS servers on the network.

To specify a RADIUS server and how the router or switch interacts with the server:

1. Configure the IP address of the RADIUS server and specify that you want to configure the router or switch interaction with the server.

   ```
   [edit access]
   user@host# edit radius-server 192.168.1.250
   ```

2. (Optional) Configure the RADIUS server accounting port number. The default accounting port number is 1813.

   ```
   [edit access radius-server 192.168.1.250]
   user@host# set accounting-port 1813
   ```

3. (Optional) Configure the port number the router or switch uses to contact the RADIUS server. The default port number is 1812.

   ```
   [edit access radius-server 192.168.1.250]
   user@host# set port 18914
   ```

4. (Optional) Configure the number of times that the router or switch attempts to contact a RADIUS accounting server. You can configure the router or switch to retry from 1 through 16 times. The default setting is 3 retry attempts.

   ```
   [edit access radius-server 192.168.1.250]
   user@host# set retry 4
   ```

5. Configure the required secret (password) that the local router or switch passes to the RADIUS client. Secrets enclosed in quotation marks can contain spaces.

   ```
   [edit access radius-server 192.168.1.250]
   user@host# set secret &nt1UE1*7688+
   ```

6. Configure the source address for the RADIUS server. Each RADIUS request sent to a RADIUS server uses the specified source address. The source address is a valid IPv4 address configured on one of the router or switch interfaces.

   ```
   [edit access radius-server 192.168.1.250]
   user@host# set source-address 192.168.1.100
   ```

7. (Optional) Configure the length of time that the local router or switch waits to receive a response from a RADIUS server. By default, the router or switch waits 3 seconds. You can configure the timeout to be from 1 through 90 seconds.

   ```
   [edit access radius-server 192.168.1.250]
   user@host# set timeout 45
   ```

Related Documentation

- AAA Service Framework Overview on page 18
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
- Example: Configuring RADIUS-Based Subscriber Authentication and Accounting on page 77

Configuring Authentication and Accounting Parameters for Subscriber Access

You use an access profile to configure authentication and accounting support for the subscriber access management feature. The access profile enables you to specify the type of methods used for authentication and accounting. You can also configure how subscriber access management collects and uses accounting statistics.

To configure authentication and accounting for subscriber access:

1. Specify the authentication and accounting methods to use.

   See "Specifying the Authentication and Accounting Methods for Subscriber Access" on page 20.

2. Specify how accounting statistics are collected.

   See "Configuring Per-Subscriber Session Accounting" on page 24.

Related Documentation

- AAA Service Framework Overview on page 18
- Configuring Router or Switch Interaction with RADIUS Servers on page 19
- Example: Configuring RADIUS-Based Subscriber Authentication and Accounting on page 77

Specifying the Authentication and Accounting Methods for Subscriber Access

You can specify the authentication and accounting methods that subscriber access management uses.

You can configure multiple authentication and accounting methods—the **authentication-order** and **accounting order** statements specify the order in which the subscriber access management feature uses the methods. For example, an authentication entry of **radius password** specifies that RADIUS authentication is performed first and, if it fails, local authentication (**password**) is done.

You can specify the following authentication methods:

NOTE: For this release, you must always specify the **radius** authentication method. Subscriber access management does not support the **password** keyword (the default), and authentication fails when no method is specified.

- **password**—Local authentication
- **radius**—RADIUS-based authentication

You can specify the following accounting methods:

- **radius**—RADIUS-based accounting

To configure the authentication and accounting methods for subscriber access management:

1. Specify the authentication methods and the order in which they are used. For this release, only **radius** is supported.

   ```
   [edit access profile isp-bos-metro-fiber-basic]
   user@host# set authentication-order radius
   ```

2. Specify the accounting method.

   ```
   [edit access profile isp-bos-metro-fiber-basic]
   user@host# set accounting order radius
   ```

Related Documentation

- Configuring Router or Switch Interaction with RADIUS Servers on page 19
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
- Configuring Per-Subscriber Session Accounting on page 24
- Example: Configuring RADIUS-Based Subscriber Authentication and Accounting on page 77

RADIUS Acct-On and Acct-Off Messages

Subscriber management supports RADIUS Acct-On and Acct-Off messages to indicate the current state of RADIUS accounting support.

RADIUS Acct-On messages indicate that accounting is being supported. Subscriber management issues Acct-On messages in the following situations:

- Accounting is enabled through configuration (for example, an accounting server is configured).
- A new access profile is configured and committed for a logical system/routing instance context. However, no Acct-On message is sent if the accounting server exists prior to the access profile and if it is simply modified.

- The router performs a cold reboot.
- The router performs a warm reboot and there are no subscribers currently logged in.
- The Authd process restarts and there are no active subscribers.

RADIUS Acct-Off messages indicate that accounting in not supported. Subscriber management issues Acct-Off messages in the following situations:

- The Authd process is terminated and there are no active subscribers.
- The router is shut down and accounting servers are currently configured (this action also logs out all current subscribers).
- The router is rebooted and redundancy is disabled.

Related Documentation

- AAA Service Framework Overview on page 18
- Configuring Per-Subscriber Session Accounting on page 24

RADIUS Accounting Statistics for Subscriber Access Overview

The AAA Service Framework enables you to configure how the router collects and uses accounting statistics for subscriber management.

For example, you can specify when statistics collection is terminated, the order in which different accounting methods are used, the types of statistics collected, and how often statistics are collected. You can also configure the router to request that the RADIUS server immediately update the accounting statistics when certain events occur, such as when a subscriber logs in or when a change of authorization (CoA) occurs.

Subscriber management provides two levels of subscriber accounting—subscriber session and service session. In subscriber session accounting, the router collects statistics for the entire subscriber session. In service session accounting, the router collects statistics for specific service sessions for the subscriber.

The router uses the RADIUS attributes and Juniper Networks VSAs listed in Table 4 on page 23 to provide the accounting statistics for subscriber and service sessions. If the session has both IPv4 and IPv6 families enabled, the router reports statistics for both families.

NOTE:

RADIUS reports subscriber statistics as an aggregate of both IPv4 statistics and IPv6 statistics.

- For an IPv4-only configuration, the standard RADIUS attributes report the IPv4 statistics and the IPv6 VSA results are all reported as 0.
- For an IPv6-only configuration, the standard RADIUS attributes and the IPv6 VSA statistics are identical, both reporting the IPv6 statistics.
- When both IPv4 and IPv6 are configured, the standard RADIUS attributes report the combined IPv4 and IPv6 statistics. The IPv6 VSAs report IPv6 statistics.

Table 4: RADIUS Attributes and VSAs Used for Per-Subscriber Session Accounting

Attribute Number	Attribute Name	Type of Statistics
26–151	IPv6-Acct-Input-Octets	IPv6
26–152	IPv6-Acct-Output-Octets	IPv6
26–153	IPv6-Acct-Input-Packets	IPv6
26–154	IPv6-Acct-Output-Packets	IPv6
26–155	IPv6-Acct-Input-Gigawords	IPv6
26–156	IPv6-Acct-Output-Gigawords	IPv6
47	Acct-Input-Packets	IPv4 and IPv6 aggregation
48	Acct-Output-Packets	IPv4 and IPv6 aggregation
52	Acct-Input-Gigawords	IPv4 and IPv6 aggregation
53	Acct-Output-Gigawords	IPv4 and IPv6 aggregation

Related Documentation

- Configuring Per-Subscriber Session Accounting on page 24
- Configuring Per-Service Session Accounting on page 25
- Example: Configuring RADIUS-Based Subscriber Authentication and Accounting on page 77

Configuring Per-Subscriber Session Accounting

To configure accounting for a subscriber session, you use an access profile, and specify how the subscriber access management feature collects and uses the accounting statistics. The router uses the RADIUS attributes and Juniper Networks VSAs discussed in "RADIUS Accounting Statistics for Subscriber Access Overview" on page 22 to provide the accounting statistics for the subscriber session.

To configure accounting for a subscriber session:

1. At the **[edit access profile *profile-name*]** hierarchy level, specify that you want to configure accounting.

   [edit access profile *profile-name*]
   user@host# edit accounting

2. (Optional) Configure AAA to issue an Acct-Stop message if the AAA server denies access to the subscriber.

   [edit access profile *profile-name* accounting]
   user@host# set accounting-stop-on-access-deny

3. (Optional) Configure AAA to send an Acct-Stop message if the subscriber fails AAA but is granted access by the AAA server.

   [edit access profile *profile-name* accounting]
   user@host# set accounting-stop-on-failure

4. (Optional) Configure the order in which multiple accounting methods are used.

   [edit access profile *profile-name* accounting]
   user@host# set order [*accounting-order*]

5. (Optional) Configure the types of statistics to gather. You can specify that the router or switch collect both volume and time statistics or only time statistics for subscriber sessions. When you change the type of statistics being collected, current subscribers continue to use the previous collection specification. Subscribers who log in after the change use the new specification.

   [edit access profile *profile-name* accounting]
   user@host# set statistics (time | volume-time)

6. (Optional) Configure the number of minutes between accounting updates. You can configure an interval from 10 through 1440 minutes. If you specify an interval of 10 through 15, the interval is rounded up to 15.

   [edit access profile *profile-name* accounting]
   user@host# set update-interval *minutes*

7. (Optional) Configure the router or switch to send an Acct-Update message to the RADIUS accounting server when the router or switch receives a response (for example, an ACK or timeout) to the Acct-Start message.

   [edit access profile *profile-name* accounting]
   user@host# set immediate-update

8. (Optional) Configure the router or switch to send an Acct-Update message to the RADIUS accounting server when a CoA occurs.

   [edit access profile *profile-name* accounting]
   user@host# **set coa-immediate-update**

Related Documentation

- RADIUS Accounting Statistics for Subscriber Access Overview on page 22
- Configuring Per-Service Session Accounting on page 25
- Example: Configuring RADIUS-Based Subscriber Authentication and Accounting on page 77

Configuring Per-Service Session Accounting

Subscriber management enables you to configure the router to collect statistics on a per-service session basis for subscribers. Per-service session accounting requires two operations. First, RADIUS must be configured to provide the name of the service, the accounting interval to use, and the type of statistics to collect (either time statistics or a combination of time and volume statistics). Second, if RADIUS VSA 26-69 is configured for time and volume statistics, you must also configure a firewall or fast update firewall filter that counts service packets—the service packet information provides the volume statistics.

The router uses the RADIUS attributes and Juniper Networks VSAs discussed in "RADIUS Accounting Statistics for Subscriber Access Overview" on page 22 to provide the accounting statistics for the subscriber session.

NOTE: The collection of time only service statistics is supported for all service sessions. However, time and volume statistics are provided for only firewall and fast update firewall service sessions.

To configure the router to provide per-service accounting statistics:

1. Ensure that the required RADIUS VSAs are configured.

   See Table 5 on page 25 for the VSAs that the router uses for per-service accounting.

2. Configure the classic firewall filter or fast update filter to count the service packets.

   See "Configuring Service Packet Counting" on page 508.

Table 5: Juniper Network VSAs Used for Per-Service Session Accounting

Attribute Number	Attribute Name	Description	Value
26-69	Service-Statistics	Enable or disable statistics for the service	• 0 = disable • 1 = enable time statistics • 2 = enable time and volume statistics

Table 5: Juniper Network VSAs Used for Per-Service Session Accounting *(continued)*

Attribute Number	Attribute Name	Description	Value
26-83	Acct-Service-Session	Name of the service	string: service-name
26-140	Service-Interim-Acct-Interval	Amount of time between interim accounting updates for this service	• range = 600–86400 seconds • 0 = disabled

Related Documentation

- Configuring Service Packet Counting on page 508
- RADIUS Accounting Statistics for Subscriber Access Overview on page 22
- Configuring Per-Subscriber Session Accounting on page 24
- Example: Configuring RADIUS-Based Subscriber Authentication and Accounting on page 77

Configuring RADIUS Server Parameters for Subscriber Access

Include the **radius** statement at the **[edit access profile *profile-name*]** hierarchy level to specify the RADIUS parameters for the subscriber access manager feature. The following list provides an overview of the parameters you can configure:

- The IP addresses of one or more RADIUS authentication and accounting servers.
- Options for the RADIUS servers, such as the format (decimal or description) used for the accounting session, the method (round-robin or direct) the router or switch uses to communicate with the servers, the NAS identifier to use for RADIUS requests, and the revert time setting that specifies when the router or switch reverts to using the primary RADIUS server.
- The RADIUS attributes to be ignored or excluded from RADIUS messages.

To configure RADIUS server parameters:

1. Specify that you want to configure RADIUS support.

   ```
   [edit access profile isp-bos-metro-fiber-basic]
   user@host# edit radius
   ```

2. Specify the addresses of RADIUS authentication and accounting servers.

   See “Specifying RADIUS Authentication and Accounting Servers for Subscriber Access” on page 27.

3. Configure the RADIUS server options.

   See “Configuring RADIUS Server Options for Subscriber Access” on page 29.

4. Configure RADIUS attributes that are ignored or excluded from RADIUS messages.

   See “Configuring How RADIUS Attributes Are Used for Subscriber Access” on page 30.

Specifying RADIUS Authentication and Accounting Servers for Subscriber Access

You can specify one or more RADIUS authentication or accounting servers to use for subscriber access management.

To configure RADIUS authentication and accounting support:

1. Specify that you want to configure RADIUS support.

   ```
   [edit access profile isp-bos-metro-fiber-basic]
   user@host# edit radius
   ```

2. Specify the IP address of the RADIUS server used for authentication.

   ```
   [edit access profile isp-bos-metro-fiber-basic radius]
   user@host# set authentication-server 192.168.1.251
   ```

3. Specify the IP address of the RADIUS server used for accounting.

   ```
   [edit access profile isp-bos-metro-fiber-basic radius]
   user@host# set accounting-server 192.168.1.250
   ```

To configure multiple RADIUS authentication or accounting servers:

- Specify the IP addresses of all RADIUS servers used for authentication or accounting.

  ```
  [edit access profile isp-bos-metro-fiber-basic radius]
  user@host# set authentication-server 192.168.1.251 192.168.1.252
  user@host# set accounting-server 192.168.1.250 192.168.1.251
  ```

Related Documentation

- Configuring Router or Switch Interaction with RADIUS Servers on page 19
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
- Configuring RADIUS Server Options for Subscriber Access on page 29
- Configuring How RADIUS Attributes Are Used for Subscriber Access on page 30
- Example: Configuring RADIUS-Based Subscriber Authentication and Accounting on page 77

RADIUS Server Options for Subscriber Access

You can specify options that the router uses when communicating with RADIUS authentication and accounting servers for subscriber access.

The following list describes the RADIUS options you can configure:

- **client-accounting-algorithm** and **client-authentication-algorithm**—The method the router uses to access RADIUS accounting and RADIUS authentication servers. You can specify the following methods:

- **direct**—The default method, in which there is no load balancing. For example, in the direct method, the router always accesses **server1** (the primary server) first, and uses **server2** and **server3** as backup servers.
- **round-robin**—The round-robin method provides load balancing by rotating router requests among the list of configured RADIUS servers. For example, if three RADIUS servers are configured to support the router, the router sends the first request to **server1**, and uses **server2** and **server3** as backup servers. The router then sends the second request to **server2**, and uses **server3** and **server1** as backups.

NOTE: When a RADIUS server in the round-robin list becomes unreachable, the next reachable server in the round-robin list is used for the current request. That same server is also used for the next request since it is at the top of the list of available servers. As a result, after a server failure, the server that is used takes up the load of two servers.

- **accounting-session-id-format**—The format the router uses to identify the accounting session. The identifier can be in one of the following formats. The router uses **decimal** format by default.
  - **decimal**—For example, **435264**
  - **description**—In the format, **jnpr interface-specifier:subscriber-session-id**. For example, **jnpr fastEthernet 3/2.6:1010101010101**
- **ethernet-port-type-virtual**—Specifies that the router uses a physical port type of **virtual** to authenticate clients. The port type is passed in RADIUS attribute 61 (NAS-Port-Type). By default the router passes a port type of **ethernet** in RADIUS attribute 61.
- **interface-description-format**—The information that is excluded from the interface description that the router passes to RADIUS for inclusion in the RADIUS attribute 87 (NAS-Port-Id). By default, the router includes both the **subinterface** and the **adapter** in the interface description. You can specify:
  - **exclude-adapter**—Exclude the adapter.
  - **exclude-subinterface**—Exclude the subinterface.
- **nas-identifier**—The value for the client RADIUS attribute 32 (NAS-Identifier), which is used for authentication and accounting requests. You can specify a string in the range 1 through 64 characters.
- **nas-port-extended-format**—Configures the RADIUS client to use the extended format for RADIUS attribute 5 (NAS-Port) and the width of the fields in the NAS-Port attribute. You can specify:
  - **adapter-width *width***—Number of bits in the adapter field.
  - **port-width *width***—Number of bits in the port field.
  - **slot-width *width***—Number of bits in the slot field.

- **stacked-vlan-width *width***—Number of bits in the SVLAN ID field.
- **vlan-width *width***—Number of bits in the VLAN ID field.

NOTE: The total of the widths must not exceed 32 bits, or the configuration will fail.

- **revert-interval**—The number of seconds that the router waits after a server has become unreachable. The router rechecks the connection to the server when the **revert-interval** expires. If the server is then reachable, it is used in accordance with the order of the server list. You can configure from 0 (off) through 429496729 seconds. The default is 60 seconds.
- **vlan-nas-port-stacked-format**—Turns off RADIUS attribute 5 (NAS-Port) to include the S-VLAN ID, in addition to the VLAN ID, for subscribers on Ethernet interfaces.

Related Documentation

- Configuring RADIUS Server Options for Subscriber Access on page 29

Configuring RADIUS Server Options for Subscriber Access

You can specify options that the router or switch uses when communicating with RADIUS authentication and accounting servers for subscriber access.

To configure RADIUS authentication and accounting server options:

1. Specify that you want to configure RADIUS.

   ```
   [edit access profile isp-bos-metro-fiber-basic]
   user@host# edit radius
   ```

2. Specify that you want to configure RADIUS options.

   ```
   [edit access profile isp-bos-metro-fiber-basic radius]
   user@host# edit options
   ```

3. (Optional) Configure the method the router or switch uses to access RADIUS accounting servers.

   ```
   [edit access profile isp-bos-metro-fiber-basic radius options]
   user@host# set client-accounting-algorithm round-robin
   ```

4. (Optional) Configure the method the router or switch uses to access RADIUS authentication servers.

   ```
   [edit access profile isp-bos-metro-fiber-basic radius options]
   user@host# set client-authentication-algorithm round-robin
   ```

5. (Optional) Configure the format the router or switch uses to identify the accounting session.

   ```
   [edit access profile isp-bos-metro-fiber-basic radius options]
   user@host# set accounting-session-id-format decimal
   ```

6. (Optional) Configure the router or switch to use a port type of **virtual** to authenticate clients.

   ```
   [edit access profile isp-bos-metro-fiber-basic radius options]
   user@host# set ethernet-port-type-virtual
   ```

7. (Optional) Specify the information that is excluded from the interface description that the router or switch passes to RADIUS for inclusion in RADIUS attribute 87 (NAS-Port-Id).

   ```
   [edit access profile isp-bos-metro-fiber-basic radius options]
   user@host# set interface-description-format exclude-adapter
   ```

8. (Optional) Configure the value for the client RADIUS attribute 32 (NAS-Identifier), which is used for authentication and accounting requests.

   ```
   [edit access profile isp-bos-metro-fiber-basic radius options]
   user@host# set nas-identifier 56
   ```

9. (Optional) Configure the RADIUS client to use the extended format for RADIUS attribute 5 (NAS-Port) and specify the width of the fields in the NAS-Port attribute. The total of the widths must not exceed 32 bits, or the configuration will fail.

   ```
   [edit access profile isp-bos-metro-fiber-basic radius options]
   user@host# set nas-port-extended-format 16
   ```

10. (Optional) Configure the number of seconds that the router or switch waits after a server has become unreachable.

    ```
    [edit access profile isp-bos-metro-fiber-basic radius options]
    user@host# set revert-interval port-width 1200
    ```

11. (Optional) Specify that RADIUS attribute 5 (NAS-Port) includes the S-VLAN ID, in addition to the VLAN ID, for subscribers on Ethernet interfaces.

    ```
    [edit access profile isp-bos-metro-fiber-basic radius options]
    user@host# set vlan-nas-port-stacked-format
    ```

Related Documentation

- RADIUS Server Options for Subscriber Access on page 27
- Configuring Router or Switch Interaction with RADIUS Servers on page 19
- Example: Configuring RADIUS-Based Subscriber Authentication and Accounting on page 77

Configuring How RADIUS Attributes Are Used for Subscriber Access

You can specify the attributes RADIUS ignores in RADIUS Access-Accept messages, and the attributes RADIUS excludes from specified message types.

To configure the attributes RADIUS ignores or excludes:

1. Specify that you want to configure RADIUS.

   ```
   [edit access profile isp-bos-metro-fiber-basic]
   user@host# edit radius
   ```

2. Specify that you want to configure how RADIUS attributes are ignored or excluded.

```
[edit access profile isp-bos-metro-fiber-basic radius]
user@host# edit attributes
```

3. Specify the attributes you want RADIUS to ignore when the attributes are in Access-Accept messages. See Table 6 on page 31 for the attributes you can configure.

```
[edit access profile isp-bos-metro-fiber-basic radius attributes]
user@host# set ignore input-filter output-filter
```

4. Configure RADIUS to exclude the specified attribute from the specified RADIUS message type. See Table 7 on page 31 for the attributes and message type combinations you can configure.

```
[edit access profile isp-bos-metro-fiber-basic radius attributes]
user@host# set exclude input-filter output-filter
```

You use the **ignore** statement to configure the router or switch to ignore a particular attribute in RADIUS Access-Accept messages. By default, the router or switch processes the attributes received from the external AAA server. Table 6 on page 31 lists the attributes supported in the **ignore** statement.

Table 6: Attributes That Can Be Ignored in RADIUS Accept-Accept Messages

CLI Entry	Attribute Name	Attribute Number
framed-ip-netmask	Framed-Ip-Netmask	RADIUS attribute 9
input-filter	Ingress-Policy-Name	Juniper VSA 26–10
logical-system:routing-instance	Virtual-Router	Juniper VSA 26–1
output-filter	Egress-Policy-Name	Juniper VSA 26–11

You use the **exclude** statement to configure the router or switch 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 router or switch includes the specified attributes in RADIUS Access-Request, Acct-On, Acct-Off, Acct-Start, and Acct-Stop messages. Table 7 on page 31 lists the attributes and message types supported in the **exclude** statement.

Table 7: Attributes That Can Be Excluded from RADIUS Messages

CLI Entry	Attribute Name	Attribute Number	Supported Message Type
accounting-authentic	Acct-Authentic	RADIUS attribute 45	Accounting-On Accounting-Off
accounting-delay-time	Acct-Delay-Time	RADIUS attribute 41	Accounting-On Accounting-Off

Table 7: Attributes That Can Be Excluded from RADIUS Messages *(continued)*

CLI Entry	Attribute Name	Attribute Number	Supported Message Type
accounting-session-id	Acct-Session-Id	RADIUS attribute 44	Access-Request Accounting-On Accounting-Off Accounting-Stop
accounting-terminate-cause	Acct-Terminate-Cause	RADIUS attribute 49	Accounting-Off
called-station-id	Called-Station-Id	RADIUS attribute 30	Access-Request Accounting-Start Accounting-Stop
calling-station-id	Calling-Station-Id	RADIUS attribute 31	Access-Request Accounting-Start Accounting-Stop
class	Class	RADIUS attribute 25	Accounting-Start Accounting-Stop
dhcp-gi-address	DHCP-GI-Address	Juniper VSA 26–57	Access-Request Accounting-Start Accounting-Stop
dhcp-mac-address	DHCP-MAC-Address	Juniper VSA 26–56	Access-Request Accounting-Start Accounting-Stop
event-timestamp	Event-Timestamp	RADIUS attribute 55	Accounting-On Accounting-Off Accounting-Start Accounting-Stop
framed-ip-address	Framed-IP-Address	RADIUS attribute 8	Accounting-Start Accounting-Stop

Table 7: Attributes That Can Be Excluded from RADIUS Messages *(continued)*

CLI Entry	Attribute Name	Attribute Number	Supported Message Type
framed-ip-netmask	Framed-IP-Netmask	RADIUS attribute 9	Accounting-Start Accounting-Stop
input-filter	Ingress-Policy-Name	Juniper VSA 26–10	Accounting-Start Accounting-Stop
input-gigapackets	Acct-Input-Gigapackets	Juniper VSA 26–42	Accounting-Stop
input-gigawords	Acct-Input-Gigawords	RADIUS attribute 52	Accounting-Stop
interface-description	Interface-Desc	Juniper VSA 26–53	Access-Request Accounting-Start Accounting-Stop
nas-identifier	NAS-Identifier	RADIUS attribute 32	Access-Request Accounting-on Accounting-off Accounting-Start Accounting-Stop
nas-port	NAS-Port	RADIUS attribute 5	Access-Request Accounting-Start Accounting-Stop
nas-port-id	NAS-Port-Id	RADIUS attribute 87	Access-Request Accounting-Start Accounting-Stop
nas-port-type	NAS-Port-Type	RADIUS attribute 61	Access-Request Accounting-Start Accounting-Stop
output-filter	Egress-Policy-Name	Juniper VSA 26–11	Accounting-Start Accounting-Stop
ouput-gigapackets	Acct-Output-Gigapackets	Juniper VSA 26–43	Accounting-Stop

Table 7: Attributes That Can Be Excluded from RADIUS Messages *(continued)*

CLI Entry	Attribute Name	Attribute Number	Supported Message Type
output-gigawords	Acct-Output-Gigawords	RADIUS attribute 53	Accounting-Stop

Related Documentation

- Configuring Router or Switch Interaction with RADIUS Servers on page 19
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
- Specifying RADIUS Authentication and Accounting Servers for Subscriber Access on page 27
- Configuring RADIUS Server Options for Subscriber Access on page 29
- Example: Configuring RADIUS-Based Subscriber Authentication and Accounting on page 77

Using RADIUS Dynamic Requests for Subscriber Access Management

RADIUS dynamic requests provide an efficient way to centrally manage subscriber sessions. The AAA Service Framework's RADIUS dynamic request support allows RADIUS servers to initiate user-related operations, such as a termination operation, by sending unsolicited request messages to the router. Without the RADIUS dynamic request feature, the only way to disconnect a RADIUS user is from the router, which can be cumbersome and time-consuming in large networks.

In a typical client-server RADIUS environment, the router functions as the client and initiates requests sent to the remote RADIUS server. However, when using RADIUS dynamic requests, the roles are reversed. For example, during a disconnect operation, the remote RADIUS server performs as the client and initiates the request (the disconnect action) — the router functions as the server in the relationship.

You create an access profile to configure the router to support RADIUS dynamic requests. This configuration enables the router to receive and act on the following types of messages from remote RADIUS servers:

- Access-Accept messages—Dynamically activate services based on attributes in RADIUS Access-Accept messages received when a subscriber logs in.
- Change-of-Authorization (CoA) messages—Dynamically modify active sessions based on attributes in CoA messages. CoA messages can include service creation requests, deletion requests, RADIUS attributes, and Juniper Networks VSAs.
- Disconnect messages—Immediately terminate specific subscriber sessions.

Related Documentation

- Dynamic Service Activation During Login Overview on page 35
- RADIUS-Initiated Change of Authorization (CoA) Overview on page 35

- RADIUS-Initiated Disconnect Overview on page 36
- Configuring RADIUS-Initiated Dynamic Request Support on page 38
- RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework on page 38
- Error-Cause Codes (RADIUS Attribute 101) for Dynamic Requests on page 52

Dynamic Service Activation During Login Overview

The AAA Service Framework enables the router to dynamically activate subscriber services as part of a subscriber login operation.

The framework sets up the subscriber session and then completes the service action specified by the Juniper Networks VSA 26–65 that is received in the Access-Accept message. If the service request is unsuccessful, the framework logs out the subscriber.

Related Documentation

- Using RADIUS Dynamic Requests for Subscriber Access Management on page 34
- Configuring RADIUS-Initiated Dynamic Request Support on page 38
- RADIUS-Initiated Disconnect Overview on page 36

RADIUS-Initiated Change of Authorization (CoA) Overview

The AAA Service Framework uses CoA messages to dynamically modify active subscriber sessions. For example, RADIUS attributes in CoA messages might instruct the framework to create, modify, or terminate a subscriber service.

CoA Messages

Dynamic request support enables the router to receive and process unsolicited CoA messages from external RADIUS servers. RADIUS-initiated CoA messages use the following codes in request and response messages:

- CoA-Request (43)
- CoA-ACK (44)
- CoA-NAK (45)

Qualifications for Change of Authorization

To complete the change of authorization for a user, the CoA-Request must contain the two RADIUS attributes shown in the following list to uniquely identify subscribers. The request must also include the appropriate VSA shown in the following list to perform the required operation. The AAA Service Framework handles the actual request.

- User-Name [attribute 1]
- Acct-Session-ID [attribute 44]

- Activate-Service [VSA 26–65]
- Deactivate-Service [VSA 26–66]

NOTE: If only the User-Name attribute is included in the CoA-Request, the router uses the first match for the username.

Message Exchange

The RADIUS server and the AAA Service Framework on the router exchange messages using UDP. The CoA-Request message sent by the RADIUS server has the same format as the Disconnect-Request packet that is sent for a disconnect operation.

The response is either a CoA-ACK or a CoA-NAK message:

- If the AAA Service Framework successfully changes the authorization, the response is a RADIUS-formatted packet with a CoA-ACK message, and the data filter is applied to the session.
- If AAA Service Framework is unsuccessful, the request is malformed, or attributes are missing, the response is a RADIUS-formatted packet with a CoA-NAK message.

NOTE: The AAA Service Framework processes one dynamic request at a time per subscriber. If the framework receives a second dynamic request (either another CoA or a Disconnect-Request) while processing a previous request for the same subscriber, the framework responds with a CoA-NAK message.

Related Documentation

- Using RADIUS Dynamic Requests for Subscriber Access Management on page 34
- Dynamic Service Activation During Login Overview on page 35
- RADIUS-Initiated Disconnect Overview on page 36
- Configuring RADIUS-Initiated Dynamic Request Support on page 38

RADIUS-Initiated Disconnect Overview

This section describes the AAA Service Framework's support for RADIUS-initiated disconnect dynamic requests. The AAA Service Framework uses disconnect messages to dynamically terminate active subscriber sessions.

Disconnect Messages

To centrally control the disconnection of remote access subscribers, the RADIUS dynamic request feature on the router receives and processes unsolicited messages from RADIUS servers.

The dynamic request feature uses the existing format of RADIUS disconnect request and response messages. RADIUS-initiated disconnect uses the following codes in its RADIUS request and response messages:

- Disconnect-Request (40)
- Disconnect-ACK (41)
- Disconnect-NAK (42)

Qualifications for Disconnect

For the AAA Service Framework to disconnect a user, the Disconnect-Request message must contain an attribute with an accounting session ID. The Disconnect-Request message can contain an Acct-Session-Id (44) attribute or an Acct-Multi-Session-Id (50) attribute for the session ID or both. If both the Acct-Session-Id and Acct-Multi-Session-Id attributes are present in the request, the router uses both attributes. If the User-Name (1) attribute is also present in the request, the username and accounting session ID are used to perform the disconnection. The AAA Service Framework handles the actual request.

Message Exchange

The RADIUS server and the AAA Service Framework exchange messages using UDP. The Disconnect-Request message sent by the RADIUS server has the same format as the CoA-Request packet that is sent for a change of authorization operation.

The disconnect response is either a Disconnect-ACK or a Disconnect-NAK message:

- If the AAA Service Framework successfully disconnects the user, the response is a RADIUS-formatted packet with a Disconnect-ACK message.
- If the AAA Service Framework cannot disconnect the user, the request is malformed, or attributes are missing from the request, the response is a RADIUS-formatted packet with a Disconnect-NAK message.

NOTE: The AAA Service Framework processes one dynamic request at a time per subscriber. If the framework receives a second dynamic request while processing a previous request (either a CoA or another Disconnect-Request) for the same subscriber, the framework responds with a Disconnect-NAK message.

Related Documentation

- Using RADIUS Dynamic Requests for Subscriber Access Management on page 34
- Dynamic Service Activation During Login Overview on page 35
- Configuring RADIUS-Initiated Dynamic Request Support on page 38

Configuring RADIUS-Initiated Dynamic Request Support

The router uses the list of specified RADIUS authentication servers for both authentication and dynamic request operations. The router listens on UDP port 3799 for dynamic requests.

To configure RADIUS dynamic request support:

- Specify the IP address of the RADIUS server.

```
[edit access profile isp-bos-metro-fiber-basic radius]
user@host# authentication-server 192.168.1.3
```

To configure the router to support dynamic requests from more than one RADIUS server:

- Specify the IP addresses of multiple RADIUS servers.

```
[edit access profile isp-bos-metro-fiber-basic radius]
user@host# authentication-server 192.168.1.3 192.168.10.15
```

Related Documentation

- Using RADIUS Dynamic Requests for Subscriber Access Management on page 34
- Dynamic Service Activation During Login Overview on page 35
- RADIUS-Initiated Change of Authorization (CoA) Overview on page 35
- RADIUS-Initiated Disconnect Overview on page 36
- RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework on page 38
- Error-Cause Codes (RADIUS Attribute 101) for Dynamic Requests on page 52

Verifying and Managing the RADIUS Dynamic-Request Feature

Purpose Display RADIUS dynamic request statistics and information.

Action

- To display RADIUS dynamic request statistics:

```
user@host>show network-access aaa statistics dynamic-requests
```

Related Documentation

- For more information, see the *Junos OS System Basics and Services Command Reference*

RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework

The AAA Service Framework supports RADIUS attributes and vendor-specific attributes (VSAs)—this support provides tunable parameters that the subscriber access management feature uses when creating subscribers and services.

RADIUS attributes are carried as part of standard RADIUS request and reply messages. The subscriber management access feature uses the RADIUS attributes to exchange

specific authentication, authorization and accounting information. VSAs allow the subscriber access management feature to pass implementation-specific information that provide extended capabilities, such as service activation or deactivation, and enabling and disabling filters.

When you use dynamic profiles, the AAA Service Framework supports the use of Junos predefined variables to specify the RADIUS attribute or VSA for the information obtained from the RADIUS server.

Related Documentation

- RADIUS IETF Attributes Supported by the AAA Service Framework on page 39
- Juniper Networks VSAs Supported by the AAA Service Framework on page 45
- DSL Forum Vendor-Specific Attributes
- Junos Predefined Variables That Correspond to RADIUS Attributes and VSAs on page 341

RADIUS IETF Attributes Supported by the AAA Service Framework

Table 8 on page 39 describes the RADIUS IETF attributes that the Junos OS AAA Service Framework supports.

NOTE: A "Yes" entry in the Dynamic CoA Support column indicates that the attribute can be dynamically configured by Access-Accept messages and dynamically modified by CoA-Request messages.

Table 8: Supported RADIUS IETF Attributes

Attribute Number	Attribute Name	Description	Dynamic CoA Support
1	User-Name	• Name of user to be authenticated. • Configurable username override.	No
2	User-Password	• Password of user to be authenticated by Password Authentication Protocol (PAP). • Configurable password override.	No
4	NAS-IP-Address	IP address of the network access server (NAS) that is requesting authentication of the user.	No
5	NAS-Port	Physical port number of the NAS that is authenticating the user.	No
6	Service-Type	Type of service the user has requested or the type of service to be provided.	No

Table 8: Supported RADIUS IETF Attributes *(continued)*

Attribute Number	Attribute Name	Description	Dynamic CoA Support
8	Framed-IP-Address	• IP address to be configured for the user. • 0.0.0.0 or absence is interpreted as 255.255.255.254.	No
9	Framed-IP-Netmask	• IP network to be configured for the user when the user is a router or switch to a network. • Absence implies 255.255.255.255.	No
11	Filter-ID	• Name of the filter list for the user. • Interpreted as input policy name.	Yes
18	Reply-Message	• Text that may be displayed to the user. • Only the first instance of this attribute is used.	No
22	Framed-Route	String that provides routing information to be configured for the user on the NAS in the format: **<addr>[/<maskLen>] [<nexthop> [<cost>]] [tag <tagValue>] [distance <distValue>]**	Yes
25	Class	An arbitrary value that the NAS includes in all accounting packets for the user if supplied by the RADIUS server.	No
27	Session-Timeout	Maximum number of consecutive seconds of service to be provided to the user before termination of the session.	No
31	Calling-Station-ID	Indicates that the NAS can send the phone number from which the call originated.	No
32	NAS-Identifier	Identifies the NAS originating the request.	No
40	Acct-Status-Type	Indicates whether this Accounting-Request marks the beginning of the user service (Start), the end (Stop), or the interim (Interim-Update).	No
41	Acct-Delay-Time	Indicates how many seconds the client has been trying to send a particular record.	No

Table 8: Supported RADIUS IETF Attributes *(continued)*

Attribute Number	Attribute Name	Description	Dynamic CoA Support
42	Acct-Input-Octets	Indicates how many octets have been received from the port during the time this service has been provided.	No
43	Acct-Output-Octets	Indicates how many octets have been sent to the port during the time this service has been provided.	No
44	Acct-Session-ID	Unique accounting identifier that makes it easy to match start and stop records in a log file. The identifier can be in one of the following formats: • **decimal**—For example, **435264** • **description**—In the generic format, **jnpr *interface-specifier:subscriber-session-id***; For example, **jnpr fastEthernet 3/2.6:1010101010101**	No
45	Acct-Authentic	Indicates how the user was authenticated: whether by RADIUS, the NAS itself, or another remote authentication protocol.	No
46	Acct-Session-Time	Indicates how long in seconds that the user has received service	No
47	Acct-Input-Packets	Indicates how many packets have been received from the port during the time this service has been provided to a framed user.	No
48	Acct-Output-Packets	Indicates how many packets have been sent to the port in the course of delivering this service to a framed user.	No

Table 8: Supported RADIUS IETF Attributes *(continued)*

Attribute Number	Attribute Name	Description	Dynamic CoA Support
49	Acct-Terminate-Cause	Contains the reason the service (a PPP session) was terminated. The service can be terminated for the following reasons: • User Request (1)—User initiated the disconnect (log out). • Idle Timeout (4)—Idle timer has expired. • Session Timeout (5)—Client reached the maximum continuous time allowed on the service or session. • Admin Reset (6)—System administrator terminated the session. • Port Error (8)—PVC failed; no hardware or no interface. • NAS Error (9)—Negotiation failures, connection failures, or address lease expiration. • 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.	No
52	Acct-Input-Gigawords	Indicates how many times the Acct-Input-Octets counter has wrapped around 2^{32} during the time this service has been provided. Can be present in Accounting-Request records only where the Acct-Status-Type is set to Stop or Interim-Update	No
53	Acct-Output-Gigawords	Indicates how many times the Acct-Output-Octets counter has wrapped around 2^{32} in the course of delivering this service. Can be present in Accounting-Request records only where the Acct-Status-Type is set to Stop or Interim-Update.	No
55	Event-Timestamp	Records the time that this event occurred on the NAS, in seconds, since January 1, 1970 00:00 UTC.	No
61	NAS-Port-Type	Indicates the type of physical port the NAS is using to authenticate the user.	No

Table 8: Supported RADIUS IETF Attributes *(continued)*

Attribute Number	Attribute Name	Description	Dynamic CoA Support
64	Tunnel-Type	• The tunneling protocol to use (in the case of a tunnel initiator) or the tunneling protocol already in use (in the case of a tunnel terminator). • Only L2TP tunnels are currently supported.	No
65	Tunnel-Medium-Type	• Transport medium to use when creating a tunnel for protocols that can operate over multiple transports. • Only IPv4 is currently supported.	No
66	Tunnel-Client-Endpoint	Address of the initiator end of the tunnel (LAC).	No
67	Tunnel-Server-Endpoint	Address of the server end of the tunnel (LNS).	No
69	Tunnel-Password	Encrypted password used to authenticate to a remote server. Recommended over using VSA Tunnel-Password [26-9] because of the encryption. Do not use both this attribute and the VSA.	No
82	Tunnel-Assignment -Id	Identifies for the LAC the tunnel to which a session is assigned. When user profiles share the same values for Tunnel-Assignment-Id, Tunnel-Server-Endpoint, and Tunnel-Type, the LAC can group these users into the same tunnel. This enables fewer tunnels to be created.	No
83	Tunnel-Preference	• If more than one set of tunneling attributes is returned by the RADIUS server to the tunnel initiator, this attribute is included in each set to indicate the relative preference assigned to each tunnel. • Included in the Tunnel-Link-Start, the Tunnel-Link-Reject, and the Tunnel-Link-Stop packets (LAC only).	No

Table 8: Supported RADIUS IETF Attributes *(continued)*

Attribute Number	Attribute Name	Description	Dynamic CoA Support
85	Acct-Interim-Interval	Number of seconds between each interim accounting update for this session. The router uses the following guidelines for interim accounting: • Attribute value is within the acceptable range (600 to 86,400 seconds)—Accounting is updated at the specified interval. • Attribute value of 0—No RADIUS accounting is performed. • Attribute value is less than the minimum acceptable value—Accounting is updated at the minimum interval (600 seconds). • Attribute value is greater than the maximum acceptable value—Accounting is updated at the maximum interval (86,400 seconds).	No
87	NAS-Port-ID	Text string that identifies the physical interface of the NAS that is authenticating the user.	No
88	Framed-Pool	Name of an assigned address pool to use to assign an address for the user.	No
90	Tunnel-Client-Auth-Id	Name of the tunnel initiator (LAC) used during the authentication phase of tunnel establishment.	No
91	Tunnel-Server-Auth-Id	Name of the tunnel terminator (LNS) used during the authentication phase of tunnel establishment.	No
95	NAS-IPv6-Address	Address of the NAS that is requesting authentication of the user.	No
96	Framed-Interface-ID	Interface identifier that is configured for the user.	No
97	Framed-IPv6-Prefix	IPv6 prefix that is configured for the user.	No
98	Login-IPv6-Host	System the user connects to when the Login-Service attribute is included.	No
99	Framed-IPv6-Route	IPv6 routing information that is configured for the user.	Yes

Table 8: Supported RADIUS IETF Attributes *(continued)*

Attribute Number	Attribute Name	Description	Dynamic CoA Support
100	Framed-IPv6-Pool	Name of the assigned pool used to assign an IPv6 prefix for the user.	No
123	Delegated-IPv6-Prefix	Prefix that is delegated to the user.	No
242	Ascend-Data-Filter	Binary data that specifies RADIUS policy definitions.	Yes

Juniper Networks VSAs Supported by the AAA Service Framework

Table 9 on page 45 describes Juniper Networks VSAs supported by the Junos OS AAA Service Framework. The AAA Service Framework uses vendor ID 4874, which is assigned to Juniper Networks by the Internet Assigned Numbers Authority (IANA).

NOTE: A "Yes" entry in the Dynamic CoA Support column indicates that the attribute can be dynamically configured by Access-Accept messages and dynamically modified by CoA-Request messages.

Table 9: Supported Juniper Networks VSAs

Attribute Number	Attribute Name	Description	Value	Dynamic CoA Support
26-1	LSRI-Name	Client logical system:routing instance name. Allowed only from RADIUS server for "default" logical system:routing instance.	string: logical system:routing instance	No
26-2	Local-Address-Pool	Address pool used to assign an address for the user. Same as RADIUS address 88, Framed-Pool.	string: address-pool-name	No
26-4	Primary-DNS	Client DNS address negotiated during IPCP.	integer: 4-byte *primary-dns-address*	No
26-5	Secondary-DNS	Client DNS address negotiated during IPCP	integer: 4-byte secondary-dns-address	No
26-6	Primary-WINS	Client WINS (NBNS) address negotiated during IPCP.	integer: 4-byte *primary-wins-address*	No
26-7	Secondary-WINS	Client WINS (NBNS) address negotiated during IPCP.	integer: 4-byte secondary-wins-address	No

Table 9: Supported Juniper Networks VSAs *(continued)*

Attribute Number	Attribute Name	Description	Value	Dynamic CoA Support
26-8	Tunnel-Virtual-Router	Virtual router name for tunnel connection.	string: tunnel-virtual-router	No
26-9	Tunnel-Password	Tunnel password in cleartext. Do not use both this VSA and the standard RADIUS attribute Tunnel-Password [69]. The standard attribute is recommended because the password is encrypted when that attribute is used.	string: tunnel-password	No
26-10	Ingress-Policy-Name	Input policy name to apply to client interface.	string: input-policy-name	Yes
26-11	Egress-Policy-Name	Output policy name to apply to client interface.	string: output-policy-name	Yes
26-12	Ingress-Statistics	Enable or disable input statistics on a client interface.	integer: • 0=disable • 1=enable	No
26-13	Egress-Statistics	Enable or disable output statistics on a client interface.	integer: • 0=disable • 1=enable	No
26-23	IGMP-Enable	Enable or disable IGMP on a client interface.	integer: • 0=disable • 1=enable	Yes
26-25	Redirect-LSRI-Name	Client logical system:routing instance name indicating to which logical system:routing instance the request is redirected for user authentication.	string: *logical-system:routing-instance*	No
26-33	Tunnel-Max-Sessions	Maximum number of sessions allowed in a tunnel.	integer: 4-octet	No
26-34	Framed-IP-Route-Tag	Route tag to apply to returned framed-ip-address.	integer: 4-octet	No
26-42	Input-Gigapackets	Number of times the input-packets attribute rolls over its 4-octet field.	integer	No

Table 9: Supported Juniper Networks VSAs *(continued)*

Attribute Number	Attribute Name	Description	Value	Dynamic CoA Support
26-43	Output-Gigapackets	Number of times the output-packets attribute rolls over its 4-octet field.	integer	No
26-55	DHCP Options	Client DHCP options.	string: dhcp-options	No
26-56	DHCP-MAC-Address	Client MAC address.	string: mac-address	No
26-57	DHCP-GI-Address	DHCP relay agent IP address.	integer: 4-octet	No
26-58	LI-Action	Traffic mirroring action. For dynamic CoA, VSA 26-58 changes the action on the mediation device identified by VSA 26–59.	0=stop mirroring 1=start mirroring 2=no action	Yes (together with 26-59)
26-59	Med-Dev-Handle	Link to which traffic mirroring is applied. For dynamic CoA, VSA 26-58 changes the action on the mediation device identified by VSA 26–59.	Salt-encrypted string	Yes (together with 26-58)
26-60	MD-Ip-Address	IP address of content destination device to which mirrored traffic is forwarded.	Salt-encrypted IP address	No
26-61	MD-Port-Number	UDP port in the content destination device to which mirrored traffic is forwarded.	Salt-encrypted integer	No
26-63	Interface-Desc	Text string that identifies the subscriber's access interface.	string: interface-description	No
26-64	Tunnel-Group	Name of the tunnel group (profile) assigned to a domain map.	string: tunnel-group-name	No
26-65	Activate-Service	Service to activate for the subscriber.	string: service-name	No
26-66	Deactivate-Service	Service to deactivate for the subscriber.	string: service-name	No
26-69	Service-Statistics	Enable or disable statistics for the service.	• 0 = disable • 1 = enable time statistics • 2 = enable time and volume statistics	Yes

Table 9: Supported Juniper Networks VSAs *(continued)*

Attribute Number	Attribute Name	Description	Value	Dynamic CoA Support
26-71	IGMP-Access-Group-Name	Access list to use for the group (G) filter.	string: 32-octet	Yes
26-72	IGMP-Access-Source-Group-Name	Access list to use for the source-group (S,G) filter.	string: 32-octet	Yes
26-74	MLD-Access-Group-Name	Access list to use for the group (G) filter.	string: 32-octet	Yes
26-75	MLD-Access-Source-Group-Name	Access list to use for the source-group (S,G) filter.	string: 32-octet	Yes
26-77	MLD-Version	MLD protocol version.	integer: 1-octet • 1=MLD version • 2=MLD version	Yes
26-78	IGMP-Version	IGMP protocol version.	integer: 1-octet • 1=IGMP version • 2=IGMP version • 3=IGMP version	Yes
26-83	Acct-Service-Session	Name of the service.	string: service-name	No
26–84	Mobile-IP-Algorithm	Authentication algorithm used for Mobile IP registration.	integer: 4-octet	No
26–85	Mobile-IP-SPI	Security parameter index number for Mobile IP registration.	integer: 4-octet	No
26–86	Mobile-IP-Key	Security association MD5 key for Mobile IP registration.	string: key	No
26–87	Mobile-IP-Replay	Replay timestamp for Mobile IP registration.	integer: 4-octet	No
26–89	Mobile-IP-Lifetime	Registration lifetime for Mobile IP registration.	integer: 4-octet	No
26-97	IGMP-Immediate-Leave	IGMP Immediate Leave.	integer: 4-octet • 0=disable • 1=enable	Yes
26-100	MLD-Immediate-Leave	MLD Immediate Leave.	integer: 4-octet • 0=disable • 1=enable	Yes

Table 9: Supported Juniper Networks VSAs *(continued)*

Attribute Number	Attribute Name	Description	Value	Dynamic CoA Support
26-106	IPv6-Ingress-Policy-Name	Input policy name to apply to a user IPv6 interface.	string: policy name	Yes
26-107	IPv6-Egress-Policy-Name	Output policy name to apply to a user IPv6 interface.	string: policy name	Yes
26-108	CoS-Shaping-Pmt-Type	CoS traffic-shaping parameter type and description: • **T01**: Scheduler-map name • **T02**: Shaping rate • **T03**: Guaranteed rate • **T04**: Delay-buffer rate	Two parts, delimited by white space: • Parameter type • Parameter value Examples: • **T01 smap_basic** • **T02 50m** • **T03 1m** • **T04 2000**	Yes
26-129	IPv6-NdRa-Prefix	Prefix value in IPv6 neighbor discovery route advertisements.	hexadecimal string	No
26-130	Interface-Set-Name	Interface set to apply to the dynamic profile.	string: interface set name	Yes
26-140	Service-Interim-Acct-Interval	Amount of time between interim accounting updates for this service.	• range = 600–86400 seconds • 0 = disabled	Yes
26-143	Max-Clients-Per-Interface	Maximum allowable client sessions per interface. For DHCP clients, the maximum sessions per logical interface.	integer: 4-octet	No

Table 9: Supported Juniper Networks VSAs *(continued)*

Attribute Number	Attribute Name	Description	Value	Dynamic CoA Support
26-146	CoS-Scheduler-Pmt-Type	CoS scheduler parameter type and description: • Null: CoS scheduler name • **T01**: CoS scheduler transmit rate • **T02**: CoS scheduler buffer size • **T03**: CoS scheduler priority • **T04**: CoS scheduler drop-profile low • **T05**: CoS scheduler drop-profile medium-low • **T06**: CoS scheduler drop-profile medium-high • **T07**: CoS scheduler drop-profile high • **T08**: CoS scheduler drop-profile any	Three parts, delimited by white space: • Scheduler name • Parameter type • Parameter value Examples: • **be_sched** • **be_sched T01 12m** • **be_sched T02 26**	Yes
26-151	IPv6-Acct-Input-Octets	IPv6 receive octets.	integer	No
26-152	IPv6-Acct-Output-Octets	IPv6 transmit octets.	integer	No
26-153	IPv6-Acct-Input-Packets	IPv6 receive packets.	integer	No
26-154	IPv6-Acct-Output-Packets	IPv6 transmit packets.	integer	No
26-155	IPv6-Acct-Input-Gigawords	IPv6 receive gigawords.	integer	No
26-156	IPv6-Acct-Output-Gigawords	IPv6 transmit gigawords.	integer	No
26-157	IPv6-NdRa-Pool-Name	IPv6 ND/RA pool name used to locally allocate an ND/RA prefix.	string	No

DSL Forum Vendor-Specific Attributes

Digital Subscriber Line (DSL) attributes are RADIUS vendor-specific attributes (VSAs) that are defined by the DSL Forum. The attributes transport DSL information that is not supported by standard RADIUS attributes and which convey information about the associated DSL subscriber and data rate. The attributes are defined in RFC 4679, *DSL Forum Vendor-Specific RADIUS Attributes*.

NOTE: Junos OS uses the vendor ID 3561, which is assigned by the Internet Assigned Numbers Authority (IANA), for the DSL Forum VSAs.

Subscriber management does not process DSL values—the router simply passes the values received from the subscriber to the RADIUS server, without performing any parsing or manipulation. However, you can manage the content of DSL VSA values either by using the client configuration to restrict the DSL VSAs that the client sends, or by configuring the RADIUS server to ignore unwanted DSL VSAs.

Table 10 on page 51 describes the DSL Forum VSAs.

Table 10: DSL Forum VSAs

Attribute Number	Attribute Name	Description	Value
[26-1]	Agent-Circuit-Id	Identifier for the subscriber agent circuit ID that corresponds to the DSLAM interface from which subscriber requests are initiated	string
[26-2]	Agent-Remote-Id	Unique identifier for the subscriber associated with the DSLAM interface from which requests are initiated	string
[26-129]	Actual-Data-Rate-Upstream	Actual upstream data rate of the subscriber's synchronized DSL link	integer: 4-octet
[26-130]	Actual-Data-Rate-Downstream	Actual downstream data rate of the subscriber's synchronized DSL link	integer: 4-octet
[26-131]	Minimum-Data-Rate-Upstream	Minimum upstream data rate configured for the subscriber	integer: 4-octet
[26-132]	Minimum-Data-Rate-Downstream	Minimum downstream data rate configured for the subscriber	integer: 4-octet
[26-133]	Attainable-Data-Rate-Upstream	Upstream data rate that the subscriber can attain	integer: 4-octet
[26-134]	Attainable-Data-Rate-Downstream	Downstream data rate that the subscriber can attain	integer: 4-octet
[26-135]	Maximum-Data-Rate-Upstream	Maximum upstream data rate configured for the subscriber	integer: 4-octet
[26-136]	Maximum-Data-Rate-Downstream	Maximum downstream data rate configured for the subscriber	integer: 4-octet
[26-137]	Minimum-Data-Rate-Upstream-Low-Power	Minimum upstream data rate in low power state configured for the subscriber	integer: 4-octet
[26-138]	Minimum-Data-Rate-Downstream-Low-Power	Minimum downstream data rate in low power state configured for the subscriber	integer: 4-octet
[26-139]	Maximum-Interleaving-Delay-Upstream	Maximum one-way upstream interleaving delay configured for the subscriber	integer: 4-octet

Table 10: DSL Forum VSAs *(continued)*

Attribute Number	Attribute Name	Description	Value
[26-140]	Actual-Interleaving-Delay-Upstream	Subscriber's actual one-way upstream interleaving delay	integer: 4-octet
[26-141]	Maximum-Interleaving-Delay-Downstream	Maximum one-way downstream interleaving delay configured for the subscriber	integer: 4-octet
[26-142]	Actual-Interleaving-Delay-Downstream	Subscriber's actual one-way downstream interleaving delay	integer: 4-octet
[26-144]	Access-Loop-Encapsulation	Encapsulation used by the subscriber associated with the DSLAM interface from which requests are initiated	string: 3-byte
[26-254]	IWF-Session	Indication that the interworking function (IWF) has been performed for the subscriber's session	No data field required

Error-Cause Codes (RADIUS Attribute 101) for Dynamic Requests

When a RADIUS-initiated CoA or disconnect operation is unsuccessful, the router includes an error-cause attribute (RADIUS attribute 101) in the CoA-NAK or Disconnect-NAK message that it sends back to the RADIUS server. If the detected error does not map to one of the supported error-cause attributes, the router sends the message without an error-cause attribute. Table 11 on page 52 describes the error-cause codes.

Table 11: Error-Cause Codes (RADIUS Attribute 101)

Code	Value	Description
401	Unsupported attribute	The request contains an attribute that is not supported (for example, a third-party attribute).
402	Missing attribute	A critical attribute (for example, the session identification attribute) is missing from a request.
404	Invalid request	Some other aspect of the request is invalid, such as if one or more attributes are not formatted properly.
503	Session context not found	The session context identified in the request does not exist on the router.
504	Session context not removable	The subscriber identified by attributes in the request is owned by a component that is not supported.
506	Resources unavailable	A request could not be honored due to lack of available NAS resources (such as memory).

Configuring an Access Profile for Subscriber Management

Access profiles enable you to specify subscriber access authentication and accounting parameters. Once created, you can attach access profiles at the **[edit logical-systems *logical-system-name* routing-instances *routing-instance-name*]** hierarchy level or for use in automatically configuring VLANs or stacked VLANs at the **[edit interfaces *interface-name* auto-configure vlan-ranges]** or **[edit interfaces *interface-name* auto-configure stacked-vlan-ranges]** hierarchy levels.

To configure an access profile:

1. Edit the access stanza.

   ```
   [edit]
   user@host# edit access
   ```

2. Specify an existing or new access profile name.

   ```
   [edit access]
   user@host# edit profile profile-name
   ```

3. Specify any desired subscriber access authentication and accounting parameters for the access profile.

Related Documentation

- Attaching Access Profiles on page 53
- Configuring Dynamic Authentication for VLAN Interfaces on page 380
- **profile on page 1039**

Attaching Access Profiles

After you have created the access profile that specifies the subscriber access management authentication and accounting parameters, you can attach the profile. Subscriber access management supports attaching access profiles at the following hierarchy levels:

- **[edit logical-systems *logical-system-name* routing-instances *routing-instance-name*]**
- **[edit interfaces *interface-name* auto-configure vlan-ranges]**
- **[edit interfaces *interface-name* auto-configure stacked-vlan-ranges]**

To attach an access profile:

1. Edit the desired hierarchy level.

   ```
   [edit]
   user@host# edit logical-systems LS1 routing-instances RI1
   ```

2. Specify the name of the access profile that you want to attach.

   ```
   [edit logical-systems logical-system-name routing-instances routing-instance-name]
   user@host# set access-profile vz-bos-metro-fios-basic
   ```

Related Documentation

- AAA Service Framework Overview on page 18

Verifying and Managing Subscriber AAA Information

Purpose View or clear subscriber access statistics and information.

Action

- To display subscriber AAA statistics:

  user@host> **show network-access aaa statistics**

- To display subscriber access AAA information:

  user@host> **show network-access aaa subscribers**

- To display subscriber session information:

  user@host> **show network-access aaa subscribers session-id** ***session-id***

- To clear subscriber access statistics and to log out specific subscribers:

  user@host> **clear network-access aaa subscriber**

- To clear AAA accounting statistics:

  user@host> **clear network-access aaa statistics accounting**

- To clear AAA address-assignment statistics for a client:

  user@host> **clear network-access aaa statistics address-assignment client**

- To clear AAA address-assignment pool statistics:

  user@host> **clear network-access aaa statistics address-assignment pool** ***pool-name***

- To clear AAA authentication statistics:

  user@host> **clear network-access aaa statistics authentication**

Related Documentation

- For more information, see the *Junos OS System Basics and Services Command Reference*

CHAPTER 3

Configuring Address-Assignment Pools for Subscriber Access

Address-Assignment Pools Overview

The address-assignment pool feature supports subscriber management functionality by enabling you to create IPv4 and IPv6 address pools that different client applications can share. For example, multiple client applications, such as DHCP, can use an address-assignment pool to provide addresses for their particular clients. Client applications can acquire addresses for either authenticated or unauthenticated clients.

Address-assignment pools support both dynamic and static address assignment. In dynamic address assignment, a client is automatically assigned an address from the address-assignment pool. In static address assignment, which is supported for IPv4 pools only, you reserve an address that is then always used by a particular client. Addresses that are reserved for static assignment are removed from the dynamic address pool and cannot be assigned to other clients.

You can configure named address ranges within an address-assignment pool. A named range is a subset of the overall address range. A client application can use named ranges to manage address assignment based on client-specific criteria. For example, for IPv4 address-assignment pools, you might create a named range that is based on a specific DHCP option 82 value. Then, when a DHCP client request matches the specified option 82 value, an address from the specified range is assigned to the client.

You can link address-assignment pools together to provide backup pools for address assignment. When the primary pool is fully allocated, the router switches to the linked, or secondary, pool and begins allocating addresses from that pool.

You can also explicitly identify that an address-assignment pool is used for ND/RA.

Related Documentation

- Configuring Address-Assignment Pools on page 56
- Address-Assignment Pools Licensing Requirements on page 61
- Example: Configuring an Address-Assignment Pool on page 79

Configuring Address-Assignment Pools

The address-assignment pool feature supports subscriber management functionality by enabling you to create address pools that can be shared by different client applications. An address-assignment pool can support either IPv4 address or IPv6 addresses. You cannot use the same pool for both types of address.

NOTE: You cannot use address-assignment pools with the J Series Services Routers DHCP server. Also, address-assignment pools are completely separate from L2TP address pools, which you create with the address-pool statement at the [edit access] hierarchy level, and NAT pools, which you create with the pool statement at the [edit services nat] hierarchy level.

To configure an address-assignment pool:

1. Configure the address-assignment pool name and specify the addresses for the pool.

   See “Configuring an Address-Assignment Pool Name and Addresses” on page 57.

2. (Optional) Configure named ranges (subsets) of addresses.

   See “Configuring a Named Address Range for Dynamic Address Assignment” on page 57.

3. (Optional) Configure address-assignment pool linking and specify the secondary pool to use when the primary pool is fully allocated.

   See “Configuring Address-Assignment Pool Linking” on page 58.

4. (Optional) Create static address bindings (IPv4 only).

   See “Configuring Static Address Assignment” on page 59.

5. (Optional) Configure attributes for DHCP clients.

   See “Configuring DHCP Client-Specific Attributes” on page 59.

6. (Optional) Specify that the address-assignment pool is used for router advertisement.

   See Configuring an Address-Assignment Pool for Router Advertisement.

Related Documentation

- Address-Assignment Pools Overview on page 55
- Address-Assignment Pools Licensing Requirements on page 61
- Example: Configuring an Address-Assignment Pool on page 79

Configuring an Address-Assignment Pool Name and Addresses

To configure an address-assignment pool, you must specify the name of the pool and configure the addresses for the pool.

To configure an IPv4 address-assignment pool:

1. Configure the name of the pool and specify the IPv4 family.

   ```
   [edit access]
   user@host# edit address-assignment pool isp_1 family inet
   ```

2. Configure the network address and the prefix length of the addresses in the pool.

   ```
   [edit access address-assignment pool isp_1 family inet]
   user@host# set network 192.168.0.0/16
   ```

To configure an IPv6 address-assignment pool:

1. Configure the name of the pool and specify the IPv6 family.

   ```
   [edit access]
   user@host# edit address-assignment pool isp_2 family inet6
   ```

2. Configure the IPv6 network prefix for the address pool. The prefix specification is required when you configure an IPv6 address-assignment pool.

   ```
   [edit access address-assignment pool isp_2 family inet6]
   user@host# set prefix 2008:2009::/32
   ```

Related Documentation

- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56

Configuring a Named Address Range for Dynamic Address Assignment

You can optionally configure multiple named ranges, or subsets, of addresses within an address-assignment pool. During dynamic address assignment, a client can be assigned an address from a specific named range. To create a named range, you specify a name for the range and define the address range.

To create a named range within an IPv4 address-assignment pool:

1. Specify the name of the address-assignment pool and the IPv4 family.

   ```
   [edit access]
   user@host# edit address-assignment pool isp_1 family inet
   ```

2. Configure the name of the range and the lower and upper boundaries of the addresses in the range.

```
[edit access address-assignment pool isp_1 family inet]
user@host# set range southeast low 192.168.102.2 high 192.168.102.254
```

To create a named range within an IPv6 address-assignment pool:

1. Specify the name of the address-assignment pool and the IPv6 family.

```
[edit access]
user@host# edit address-assignment pool isp_2 family inet6
```

2. Configure the name of the range and define the range. You can define the range based on the lower and upper boundaries of the prefixes in the range, or based on the length of the prefixes in the range.

```
[edit access address-assignment pool isp_2 family inet6]
user@host# set range dsl-range low 2008:2010:2011:0100::/64 high
  2008:2010:2011:ffff::/64
user@host# set range fiber-east prefix-length 48
```

Related Documentation

- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56

Configuring Address-Assignment Pool Linking

Address-assignment pool linking enables you to specify a secondary address pool for the router to use when the primary address-assignment pool is fully allocated. When the primary pool is has no available addresses, the router automatically switches over to the linked secondary pool and begins allocating addresses from that pool. The router uses a secondary pool only when the primary address-assignment pool is fully allocated.

You can create a chain of multiple linked pools. For example you can link pool A to pool B, and link pool B to pool C. When pool A has no available addresses, the router switches to using pool B for addresses. When pool B is exhausted, the router switches to pool C. There is no limit to the number of linked pools in a chain. However, you cannot create multiple links to or from the same pool—a pool can be linked to only one secondary pool, and a secondary pool can be linked from only one primary pool. Also, two linked primary and secondary pools must be of the same family type, either IPv4 or IPv6.

To link an address-assignment pool to a secondary pool:

1. Specify the name of the primary address-assignment pool.

```
[edit access]
user@host# edit address-assignment pool pool-name
```

2. Configure the secondary pool to which the primary pool will be linked.

```
[edit access address-assignment pool isp_1]
user@host# set link pool-name
```

Related Documentation

- Address-Assignment Pools Overview on page 55
- Address-Assignment Pools Licensing Requirements on page 61
- Example: Configuring an Address-Assignment Pool on page 79

Configuring Static Address Assignment

You can optionally create a static IPv4 address binding by reserving a specific address for a particular client. The address is removed from the address-assignment pool so that it is not assigned to another client. When you reserve an address, you identify the client host and create a binding between the client MAC address and the assigned IP address. IPv6 address-assignment pools do not support static address binding.

To configure a static binding for an IPv4 address:

1. Specify the name of the IPv4 address-assignment pool containing the IP address you want to reserve for the client.

   ```
   [edit access]
   user@host# edit address-assignment pool isp_1 family inet
   ```

2. Specify the name of the client for the static binding, the client MAC address, and the IP address to reserve for the client. This configuration specifies that the client with MAC address 90:00:00:01:00:01 is always assigned IP address 192.168.44.12.

   ```
   [edit access address-assignment pool isp_1 family inet]
   user@host# set host svale6_boston_net hardware-address 90:00:00:01:00:01
     ip-address 192.168.44.12
   ```

Related Documentation

- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56

Configuring DHCP Client-Specific Attributes

You use the address-assignment pool feature to include application-specific attributes when clients obtain an address. The client application, such as DHCP, uses the attributes to determine how addresses are assigned, and to also provide optional application-specific characteristics to the client. For example, the DHCP application might specify that a client that matches certain prerequisite information is dynamically assigned an address from a particular named range. Based on which named range is used, DHCP specifies additional DHCP attributes such as the boot file that the client uses, the lease grace period, and the maximum lease time.

You use the **dhcp-attributes** statement to configure DHCP client-specific attributes for address-assignment pools. “DHCP Attributes for Address-Assignment Pools” on page 60 describes the supported attributes you can configure for IPv4 and IPv6 address-assignment pools.

To configure address-assignment pool attributes for DHCP clients:

1. Specify the name and IP family of the address-assignment pool.

   ```
   [edit access]
   user@host# edit address-assignment pool isp_1 family inet
   ```

2. Configure optional DHCP client attributes.

   ```
   [edit access address-assignment pool isp_1 family inet]
   user@host# set dhcp-attributes boot-server 192.168.200.100 grace-period 3600
     maximum-lease-time 18000
   ```

Related Documentation

- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56
- DHCP Attributes for Address-Assignment Pools on page 60

DHCP Attributes for Address-Assignment Pools

Table 12 on page 60 describes the DHCP client attributes that you can use with the **dhcp-attributes** statement when you configure address-assignment pools. Table 13 on page 61 describes the DHCPv6 client attributes for configuring IPv6 address-assignment pools.

Table 12: DHCP Attributes

Attribute	Description	DHCP Option
boot-file	Boot filename advertised to the client, and used by the client to complete configuration.	67
boot-server	Boot server containing the boot file.	66
domain-name	Domain in which clients search for a DHCP server host.	15
grace-period	Grace period offered with the lease.	–
maximum-lease-time	Maximum lease time allowed by the DHCP server.	51
name-server	IP address of domain name server.	6
netbios-node-type	NetBIOS node type.	46
option	User-defined options.	–
option-match	Maps option 82 value to named address range.	–
router	IP address for routers on the subnetwork.	3
server-identifier	IP address used as the DHCP source address	54

Table 12: DHCP Attributes *(continued)*

Attribute	Description	DHCP Option
tftp-server	Trivial File Transfer Protocol (TFTP) server that the client uses to obtain the client configuration file.	150
wins-server	IP address of the Windows NetBIOS name server.	44

Table 13: DHCPv6 Attributes

Attribute	Description	DHCPv6 Option
dns-server	IPv6 address of DNS server to which clients can send DNS queries.	23
grace-period	Grace period offered with the lease.	–
maximum-lease-time	Maximum lease time allowed by the DHCP server.	–
option	User-defined options.	–
sip-server-address	IPv6 address of SIP outbound proxy server.	22
sip-server-domain-name	Domain name of the SIP outbound proxy server.	21

Related Documentation

- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56
- Configuring DHCP Client-Specific Attributes on page 59

Address-Assignment Pools Licensing Requirements

The address-assignment pool feature is part of the Junos Subscriber Management Feature Pack license. You must install and properly configure the license to meet the requirements for using the address-assignment pool feature.

Related Documentation

- For information about installing and managing Junos licenses, see the “Installing and Managing Junos Licenses” chapter of the *Junos OS Installation and Upgrade Guide*

Tracing Address-Assignment Pool Processes

The Junos OS trace operations feature tracks address-assignment pool operations and records events in a log file. By default, the tracing operation is inactive. To trace address-assignment pool processes, you specify flags in the **traceoptions** statement at the **[edit system processes general-authentication-service]** hierarchy level. The default tracing behavior is the following:

- Important events are logged in a file called **authd** located in the **/var/log** directory. You cannot change the directory (**/var/log**) in which trace files are located.
- When the file **authd** reaches 128 kilobytes (KB), it is renamed **authd.0**, then **authd.1**, and so on, until there are three trace files. Then the oldest trace file (**authd.2**). is overwritten. For more information about how log files are created, see the *Junos OS System Log Messages Reference*.
- Log files can be accessed only by the user who configures the tracing operation.

The address-assignment pool tracing operations are described in the following sections:

- Configuring the Address-Assignment Pool Trace Log Filename on page 62
- Configuring the Number and Size of Address-Assignment Pool Processes Log Files on page 62
- Configuring Access to the Log File on page 63
- Configuring a Regular Expression for Lines to Be Logged on page 63
- Configuring the Trace Operation on page 63

Configuring the Address-Assignment Pool Trace Log Filename

By default, the name of the file that records trace output for address-assignment pools is **authd**. You can specify a different name by including the **file** statement at the **[edit system processes general-authentication-service]** hierarchy level:

To configure the filename for address-assignment pool tracing operations:

- Specify the name of the file used for the trace output.

```
[edit system processes general-authentication-service traceoptions]
user@host# set file aap_logfile_1
```

Configuring the Number and Size of Address-Assignment Pool Processes Log Files

By default, when the trace file reaches 128 kilobytes (KB) in size, it is renamed ***filename*.0**, then ***filename*.1**, and so on, until there are three trace files. Then the oldest trace file (***filename*.2**) is overwritten.

You can optionally configure the maximum file size to be from 10 KB through 1 gigabyte (GB). You can also specify the number of trace files to be from 2 through 1000.

For example, you can set the maximum file size to 2 MB, and the maximum number of files to 20. When the file that receives the output of the tracing operation (***filename***) reaches 2 MB, ***filename*** is renamed ***filename*.0**, and a new file called ***filename*** is created. When the new ***filename*** reaches 2 MB, ***filename*.0** is renamed ***filename*.1** and ***filename*** is renamed ***filename*.0**. This process repeats until there are 20 trace files. Then the oldest file (***filename*.19**) is overwritten by the newest file (***filename*.0**).

To configure the number and size of trace files:

- Specify the name, number, and size of the file used for the trace output, by including the **files** and **size** options with the **traceoptions** statement.

```
[edit system processes general-authentication-service traceoptions]
user@host# set file aap_logfile_1 files 20 size 2097152
```

Configuring Access to the Log File

By default, log files can be accessed only by the user who configures the tracing operation. You can allow all users to read the log file and you can explicitly set the default behavior of the log file.

To specify that all users can read the log file:

- Configure the log file to be world-readable.

```
[edit system processes general-authentication-service traceoptions]
user@host# set file aap_logfile_1 world-readable
```

To explicitly set the default behavior, in which the log file can only be read by the user who configured tracing:

- Configure the log file to be no-world-readable.

```
[edit system processes general-authentication-service traceoptions]
user@host# set file aap_logfile_1 no-world-readable
```

Configuring a Regular Expression for Lines to Be Logged

By default, the trace operation output includes all lines relevant to the logged events. You can refine the output by including regular expressions (regex) that will be matched.

To configure regular expressions to match:

- Configure the regular expression.

```
[edit system processes general-authentication-service traceoptions]
user@host# set file aap_logfile_1 match regex
```

Configuring the Trace Operation

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
address-assignment	All address-assignment pool events
all	All tracing operations
configuration	Configuration events
framework	Authentication framework events
ldap	LDAP authentication events

Flag	Description
local-authentication	Local authentication events
radius	RADIUS authentication events

To configure the flags for the event to be logged:

- Configure the flags.

  [edit system processes general-authentication-service traceoptions]
  user@host# **set flag address-assignment**

CHAPTER 4

Configuring Domain Maps for Subscriber Access

Domain Mapping Overview

Domain mapping enables you to configure a map that specifies access options and session-specific parameters and that is based on the domain name of subscriber sessions. The router applies the mapped options and parameters to sessions for subscribers that have the specified domains. For example, you might configure a domain map that is based on the domain name **xyz.com**. The options and parameters in that domain map are then applied when subscribers with the specfied domain name (for example, **bob@xyz.com**, **raj@xyz.com**, and **juan@xyz.com**) request an AAA service.

Table 14 on page 66 describes the access options and parameters you can configure in domain maps.

Table 14: Domain Map Options and Parameters

Option	Description
AAA logical system/routing instance	Logical system/routing instance that performs AAA services for subscriber sessions.
Access profile	Access profile applied to subscriber sessions.
Address pool	Address pool used to allocate addresses to subscribers.
Domain name rules	Rules for domain name usage, including domain name stripping, supported delimiters, and parse direction (delimiters and the parse direction are configured globally).
Dynamic profile	Dynamic profile applied to subscriber sessions.
PADN parameters	PPPoE route information for subscriber sessions.
Target logical system/routing instance	Logical system/routing instance to which subscriber sessions are mapped.
Tunnel profile	Tunnel profile applied to subscriber sessions.

Default Domain Map

You can configure a default domain map that the router uses for subscribers whose domain name does not explicitly match any existing domain maps. The router also uses the default domain map when a subscriber username does not include a domain name.

You might configure the default domain map to provide limited feature support for guest subscribers, such as a specific address pool used for guests or the logical system that provides AAA services. When the router is unable to match a subscriber request to a domain map, the router then uses the rules specified in the domain map configuration to handle the subscriber request.

Related Documentation

- Configuring Domain Maps on page 66

Configuring Domain Maps

To configure domain maps:

1. Create the domain map. For the map name, specify the domain name for which the map will be used (use **default** for the name of the default domain map).

   ```
   [edit access]
   user@host# edit domain map domain-map-name
   ```

   - For example, to create a domain map that will be mapped to subscribers with the domain name, **xyz.com**:

     ```
     [edit access]
     ```

```
user@host# edit domain map xyz.com
```

- To create a default domain map that will be mapped to subscribers with non-matching domain names and subscribers without domain names:

```
[edit access]
user@host# edit domain map default
```

2. (Optional) Specify the access profile used to apply access rules for the domain map.

   See "Specifying an Access Profile in a Domain Map" on page 67.

3. (Optional) Configure the dynamic-profile that provides dynamic access rules for the domain map.

   See "Specifying a Dynamic Profile in a Domain Map" on page 68.

4. (Optional) Specify the address pool used to allocate address for the domain map.

   See "Specifying an Address Pool in a Domain Map" on page 69.

5. (Optional) Configure the non-default logical system/routing instance that provides AAA services for the domain map.

   See "Specifying an AAA Logical System/Routing Instance in a Domain Map" on page 70.

6. (Optional) Configure the non-default target logical system/routing instance for subscriber session mapping.

   See "Specifying a Target Logical System/Routing Instance in a Domain Map" on page 71.

7. (Optional) Configure rules for domain names, for example; delimiters, parsing direction, and domain stripping. Delimiters and parsing direction are configured globally, for all domain maps. Domain stripping is enabled in the domain map.

   See "Configuring Domain Name Usage for Domain Maps" on page 71.

8. (Optional) Configure the tunnel profile that provides tunnel definitions for the domain map..

   See "Specifying a Tunnel Profile in a Domain Map" on page 74.

9. (Optional) Configure the PADN parameters used for PPPoE route information for the domain map.

   See "Configuring PADN Parameters for a Domain Map" on page 74.

Related Documentation

- Domain Mapping Overview on page 65
- Verifying and Managing Domain Map Configuration on page 75

Specifying an Access Profile in a Domain Map

You use access profiles to specify the access rules and options (for example, the RADIUS authentication server and attributes) that the router applies to subscriber sessions. The domain map feature enables you to apply a specific access profile for subscribers in a particular domain.

Access profiles can be specified or modified in several different ways. If conflicts occur, the router applies the access profiles based on the precedence rules shown in table Table 15 on page 68.

Table 15: Precedence Rules for Applying Access Profiles

Precedence (High to Low)	How the Access Profile Is Applied
1	Specified by the RADIUS Redirect-LSRI-Name attribute (VSA 26-25)
2	Specified in the domain map configuration stanza
3	Indirectly specified in the domain map configuration stanza by the AAA logical system/routing instance mapping
4	Specified in the client configuration stanza
5	Specified in the logical system/routing instance configuration stanza

To include an access profile in a domain map:

1. Specify the domain map you want to configure.

   [edit access]
   user@host# **edit domain map** ***domain-map-name***

2. Specify the access profile you want to include in the domain map.

   [edit access domain map *domain-map-name*]
   user@host# **set access-profile** ***profile-name***

Related Documentation

- Domain Mapping Overview on page 65
- Configuring Domain Maps on page 66

Specifying a Dynamic Profile in a Domain Map

A dynamic profile defines the set of characteristics that provide dynamic access and services for subscriber sessions (such as, class-of-service, protocols, and interface support). The domain map feature enables you to apply a specific dynamic profile based on subscriber domains.

Dynamic profiles are configured at the **[edit dynamic-profiles]** hierarchy, and can be specified or modified in several different ways. If conflicts occur, the router applies the dynamic profiles based on the precedence rules shown in Table 16 on page 68.

Table 16: Precedence Rules for Applying Dynamic Profiles

Precedence (High to Low)	How the Dynamic Profile Is Applied
1	Specified by the RADIUS LSRI-Name attribute (VSA 26-1) or the Redirect-LSRI-Name attribute (VSA 26-25)

Table 16: Precedence Rules for Applying Dynamic Profiles *(continued)*

Precedence (High to Low)	How the Dynamic Profile Is Applied
2	Specified in the domain map configuration stanza
3	Specified in the client configuration stanza

To include a dynamic profile in a domain map:

1. Specify the domain map you want to configure.

   ```
   [edit access]
   user@host# edit domain map domain-map-name
   ```

2. Specify the dynamic profile you want to include in the domain map.

   ```
   [edit access domain map domain-map-name]
   user@host# set dynamic-profile profile-name
   ```

Related Documentation

- Domain Mapping Overview on page 65
- Configuring Domain Maps on page 66

Specifying an Address Pool in a Domain Map

You can use the domain map feature to specify the address pool that the router uses to allocate address for subscriber sessions. The address pool can include both IPv4 and IPv6 address ranges.

Address pools can be specified or modified in several different ways. If conflicts occur, the router applies the address pool based on the precedence rules shown in Table 17 on page 69.

Table 17: Precedence Rules for Determining the Address Pool to Use

Precedence (High to Low)	How the Address Pool Reference Is Provided
1	Specified by the RADIUS Framed-Pool attribute (either RADIUS attribute 88 or VSA 26-2)
2	Configured in the domain map configuration stanza
3	Specified in the client configuration stanza (by address match rules)

To specify the address pool used for a domain map:

1. Specify the domain map you want to configure.

   ```
   [edit access]
   user@host# edit domain map domain-map-name
   ```

2. Specify the address pool you want to use for the domain map.

[edit access domain map *domain-map-name*]
user@host# **set address-pool** ***pool-name***

Related Documentation

- Domain Mapping Overview on page 65
- Configuring Domain Maps on page 66

Specifying an AAA Logical System/Routing Instance in a Domain Map

When you configure a domain map, by default the subscriber's logical system/routing instance provides the AAA services for subscriber session in the specified domain. You can optionally configure the domain map to specify a particular logical system/routing instance to provide AAA services.

To configure a non-default logical system to provide AAA services:

1. Specify the domain map you want to configure.

   [edit access]
   user@host# **edit domain map** ***domain-map-name***

2. Specify the logical system and optionally the non-default routing instance that will provide AAA services.

   - To configure a non-default logical system and default routing instance to provide AAA services:

     [edit access domain map *domain-map-name*]
     user@host# **set aaa-logical-system** ***logical-system-name***

   - To configure a non-default logical system and a non-default routing instance to provide AAA services:

     [edit access domain map *domain-map-name*]
     user@host# **set aaa-logical-system** ***logical-system-name*** **aaa-routing-instance** ***routing-instance-name***

To configure that the default logical system and a non-default routing instance provide AAA services:

1. Specify the domain map you want to configure.

   [edit access]
   user@host# **edit domain map** ***domain-map-name***

2. Specify the non-default routing instance. The AAA logical system is automatically set to the default.

   [edit access domain map *domain-map-name*]
   user@host# **set aaa-routing-instance** ***routing-instance-name***

Related Documentation

- Domain Mapping Overview on page 65
- Configuring Domain Maps on page 66

Specifying a Target Logical System/Routing Instance in a Domain Map

When you configure a domain map, by default the router maps the subscriber session to the subscriber's logical system/routing instance. You can optionally configure the domain map to map the subscriber session to a specific target logical system and a specific routing instance. You can also configure the mapping to use a specific non-default routing instance with the default logical system.

To map subscriber sessions to a non-default target logical system:

1. Specify the domain map you want to configure.

   [edit access]
   user@host# **edit domain map** ***domain-map-name***

2. Specify the target logical system and, optionally, the non-default target routing instance to which the subscriber session will be mapped.

   - To configure a non-default target logical system and default target routing instance:

     [edit access domain map *domain-map-name*]
     user@host# **set target-logical-system** ***logical-system-name***

   - To configure a non-default target logical system and a non-default target routing instance:

     [edit access domain map *domain-map-name*]
     user@host# **set target-logical-system** ***logical-system-name*** **target-routing-instance** ***routing-instance-name***

To map subscriber sessions to the default target logical system and a non-default routing instance:

1. Specify the domain map you want to configure.

   [edit access]
   user@host# **edit domain map** ***domain-map-name***

2. Specify the non-default target routing instance. The target logical system is automatically set to the default.

   [edit access domain map *domain-map-name*]
   user@host# **set target-routing-instance** ***routing-instance-name***

Related Documentation

- Domain Mapping Overview on page 65
- Configuring Domain Maps on page 66

Configuring Domain Name Usage for Domain Maps

You can configure how the router determines domain names for the domain mapping feature. At the global level, you can specify rules that are used for all domain maps. The global rules enable you to specify additional characters that the router can recognize as domain name delimiters and to specify the direction the router uses to parse domain

names. At the domain map level, you can enable domain name stripping. Domain name stripping specifies that the router remove the domain name from the subscriber username prior to performing any additional processing for the domain map.

To configure domain name usage rules for domain maps:

1. (Optional) Configure the domain name delimiters you want the router to recognize for all domain maps.

   See “Specifying Domain Name Delimiters” on page 72.

2. (Optional) Configure the parse direction you want the router to use when determining domain names for all domain maps.

   See “Specifying the Parsing Direction for Domain Names” on page 73.

3. (Optional) Configure the router to remove the domain name from usernames in the domain map before using AAA services.

   See “Enabling Domain Name Stripping” on page 73.

Related Documentation

- Domain Mapping Overview on page 65
- Configuring Domain Maps on page 66

Specifying Domain Name Delimiters

A delimiter is the character that separates a subscriber username from the domain name. Delimiters are commonly used for domain name parsing or stripping. You can specify a maximum of eight delimiters that the router uses to recognize domain names for all domain maps. If you do not configure any delimiters, the router uses the @ character by default.

For example, your network might include the subscribers **bob@abc.com**, **pete!xyz.com**, and **maria\pqr.com**. In this case, you would configure the router to recognize the characters @, **!**, and **** as delimiters.

Keep the following guidelines in mind when specifying delimiters:

- You cannot use the semicolon (;) as a delimiter.
- If you configure optional delimiters, you must also specify the @ character (the default delimiter) if you want to continue to use it as a delimiter.
- If you configure optional delimiters and then unconfigure them, the router sets the domain map delimiter back to the default @ character.

To configure domain name delimiters for all domain maps:

1. Specify that you want to configure domain attributes.

   ```
   [edit]
   user@host# edit access domain
   ```

2. Specify the characters you want to use as delimiters. Do not include spaces between the delimiters.

   ```
   [edit access domain]
   user@host# set delimiter [delimiter-character]
   ```

Related Documentation

- Configuring Domain Name Usage for Domain Maps on page 71

Specifying the Parsing Direction for Domain Names

You can specify the direction in which the router performs the parsing operation it uses to identify subscriber domain names for all domain maps. During the parsing operation, the router searches the username until it recognizes a delimiter. It then considers anything to the right of the delimiter as the domain. By default, the router parses from right to left, starting at the right-most character in the username.

The parsing direction you use is important when there are nested domain names. For example, for the username **user1@abc.com@xyz.com**, right-to-left parsing produces a domain name of **xyz.com**. For the same username, left-to-right parsing produces a domain name of **abc.com@xyz.com**.

To configure the domain name parsing direction for all domain maps:

1. Specify that you want to configure domain attributes.

   ```
   [edit]
   user@host# edit access domain
   ```

2. Specify the parsing direction you want the router to use.

   ```
   [edit access domain]
   user@host# set parse-direction (left-to-right | right-to-left)
   ```

Related Documentation

- Configuring Domain Name Usage for Domain Maps on page 71

Enabling Domain Name Stripping

You can configure the router to strip the domain name from usernames before any AAA services are used. Domain name stripping is done for domain maps. The router uses the delimiters and parsing direction you globally configure to determine the domain name that is removed. For example, if the router uses the default delimiter and parsing direction **right-to-left**, the username **user1@xyz.com** is stripped to be **user1**.

To configure the router to strip the domain name from usernames in a domain map:

1. Specify the domain map for the stripping operation.

   ```
   [edit]
   user@host# edit access domain map domain-map-name
   ```

2. Enable domain name stripping.

[edit access domain map *domain-map-name*]
user@host# **set strip-domain**

Related Documentation
- Configuring Domain Name Usage for Domain Maps on page 71

Specifying a Tunnel Profile in a Domain Map

Tunnel profiles specify tunnel definitions (for example, a set of L2TP tunnels and their attributes) that the router applies to subscriber sessions. The domain map feature enables you to apply a specific tunnel profile to subscribers in a particular domain.

NOTE: A tunnel profile specified by a RADIUS server in the Tunnel-Group attribute (VSA 26-64) takes precedence over the tunnel profile specified in the domain map.

To include an tunnel profile in a domain map:

1. Specify the domain map you want to configure.

   [edit access]
   user@host# **edit domain map *domain-map-name***

2. Specify the tunnel profile you want to include in the domain map.

   [edit access domain map *domain-map-name*]
   user@host# **set tunnel-profile *profile-name***

Related Documentation
- Domain Mapping Overview on page 65
- Configuring Domain Maps on page 66

Configuring PADN Parameters for a Domain Map

You can configure PPPoE to receive PPPoE Active Discovery Network (PADN) messages when a subscriber connects to a PPPoE server. The PADN information associates the PPPoE session with a set of routes that the session can use. You can configure the route information in domain maps, which enables you to apply specific PADN information to subscribers in a particular domain. You can configure a maximum of 16 routes in a domain map.

To configure PADN parameters in a domain map:

1. Specify the domain map you want to configure.

   [edit access]
   user@host# **edit domain map *domain-map-name***

2. Specify the PADN route information you want to include in the domain map. For each route, include the destination IP address, subnet mask, and route metric.

   [edit access domain map *domain-map-name*]

user@host# set padn *destination-address* mask *destination-mask* metric *route-metric*

Related Documentation

- Domain Mapping Overview on page 65
- Configuring Domain Maps on page 66

Verifying and Managing Domain Map Configuration

Purpose Display information related to domain maps.

Action

- To display statistics for domain maps:

  user@host> **show network-access domain-map**

- To display domain map information for a specific subscriber session:

  user@host> **show network-access aaa subscribers session-id**

Related Documentation

- Domain Mapping Overview on page 65
- Configuring Domain Maps on page 66

CHAPTER 5

AAA and Remote Subscriber Access Configuration Examples

Example: Configuring RADIUS-Based Subscriber Authentication and Accounting

This example shows a RADIUS-based authentication and accounting configuration.

```
[edit access]
radius-server {
    192.168.1.250 {
        port 1812;
        accounting-port 1813;
        retry 3;
        secret &tIUEI*7688+;
        source-address 192.168.1.100;
        timeout 45;
    }
    192.168.1.251 {
        port 1812;
        accounting-port 1813;
        retry 3;
        secret $Dyu*UY(877-;
        source-address 192.168.1.100;
        timeout 30;
    }
    192.168.1.252 {
        port 1812;
        secret $Dyu*UY(877-;
    }
}
profile isp-bos-metro-fiber-basic {
    authentication {
        order radius none;
    }
    accounting {
        order radius;
        accounting-stop-on-access-deny;
```

```
    accounting-stop-on-failure;
    immediate-update;
    statistics time;
    update-interval 12;
  }
  radius {
    authentication-server 192.168.1.251 192.168.1.252;
    accounting-server 192.168.1.250 192.168.1.251;
    options {
      accounting-session-id-format decimal;
      client-accounting-algorithm round-robin;
      client-authentication-algorithm round-robin;
      nas-identifier 56;
    }
    attributes {
      ignore {
        framed-ip-netmask;
      }
      exclude {
        accounting-delay-time [accounting-start accounting-stop];
        accounting-session-id [access-request accounting-on accounting-off
        accounting-start accounting-stop];
        dhcp-gi-address [access-request accounting-start accounting-stop];
        dhcp-mac-address [access-request accounting-start accounting-stop];
        nas-identifier [access-request accounting-start accounting-stop];
        nas-port [accounting-start accounting-stop];
        nas-port-id [accounting-start accounting-stop];
        nas-port-type [access-request accounting-start accounting-stop];
      }
    }
  }
}
[edit logical-systems isp-bos-metro-12 routing-instances isp-cmbrg-12-32]
interfaces {
  lo0 {
    unit 0 {
      family inet {
        address 192.168.1.100/24;
      }
    }
  }
  ge-0/0/0 {
    vlan-tagging;
    unit 0 {
      vlan-id 200;
      family inet {
        unnumbered-address lo0.0;
      }
    }
  }
}
```

Related Documentation

- Configuring Router or Switch Interaction with RADIUS Servers on page 19

Example: Configuring an Address-Assignment Pool

This example shows an address-assignment pool configuration that creates two pools, one for IPv4 DHCP clients (**isp_1**) , and a second pool (**chi-fiber-ra**) that is used for router advertisement.

```
[edit access]
address-assignment {
   network-discovery-router-advertisement chi-fiber-ra;
   pool isp_1 {
      family inet {
         network 192.168.0.0/16;
         range southeast {
            low 192.168.102.2 high 192.168.102.254;
         }
         range northeast {
            low 192.168.119.2 high 192.168.119.250;
         }
         host svale6.boston.net {
            hardware-address 90:00:00:01:00:01;
            ip-address 192.168.44.12;
         }
         dhcp-attributes {
            option-match {
               option-82 {
                  circuit-id fiber range northeast;
               }
               option-82 {
                  circuit-id cable_net range southeast;
               }
            }
            boot-file boot.client;
            boot-server 192.168.200.100;
            grace-period 3600;
            maximum-lease-time 18000;
            netbios-node-type p-node;
            router 192.168.44.44 192.168.44.45;
         }
      }
   }
   pool chi-fiber-ra {
      family inet6 {
         prefix 2008:2009:2010::/48;
         range fiber3 {
            low 2008:2009:2010::1/64;
            high 2008:2009:2010::5/64;
         }
      }
   }
}
```

This example creates an IPv4 address-assignment pool named **isp-1**, which contains two named address ranges, **southeast** and **northeast**. The address-assignment pool also contains a static binding for client **host sval6.boston.net**. The ISP_1 pool configuration

also includes the **dhcp-attributes** statement, indicating that the pool is used for DHCP clients. If the option 82 **circuit-id** entry matches the string **fiber**, then DHCP assigns the client an address from the **northeast** range. If the option 82 **circuit-id** matches the string **cable_net**, DHCP assigns an address from the **southeast** range.

The second address-assignment pool created in this example is **chi-fiber-ra**. The **neighbor-discovery-router-advertisement** statement at the beginning of the syntax specifies that this named address-assignment pool is used for router advertisement. The syntax at the end of the example configures the address-assignment pool named **chi-fiber-ra**.

Related Documentation

- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56
- Configuring an Address-Assignment Pool for Router Advertisement

PART 3

DHCP Local Server for Subscriber Access

CHAPTER 6

DHCP Local Server Overview

Extended DHCP Local Server Overview

You can enable the router to function as an extended DHCP local server and configure the extended DHCP local server options on the router. The extended DHCP local server provides an IP address and other configuration information in response to a client request.

The extended DHCP local server enhances traditional DHCP server operation in which the client address pool and client configuration information reside on the DHCP server. With the extended DHCP local server, the client address and configuration information reside in centralized address-assignment pools, which are managed independently of the DHCP local server and which can be shared by different client applications.

NOTE: You can also configure the extended DHCP local server to support IPv6 clients. See "DHCPv6 Local Server Overview" on page 88 for information about the DHCPv6 local server feature.

The extended DHCP local server also supports advanced pool matching and the use of named address ranges. You can also configure the local server to use DHCP option 82 information in the client PDU to determine which named address range to use for a particular client. The client configuration information, which is configured in the address-assignment pool, includes user-defined options, such as boot server, grace period, and lease time.

Configuring the DHCP environment that includes the extended DHCP local server requires two independent configuration operations, which you can complete in any order. In one operation, you configure the extended DHCP local server on the router and specify how the DHCP local server determines which address-assignment pool to use. In the other operation, you configure the address-assignment pools used by the DHCP local server. The address-assignment pools contain the IP addresses, named address ranges, and configuration information for DHCP clients. See "Configuring Address-Assignment Pools" on page 56 for details about creating and using address-assignment pools.

NOTE: The extended DHCP local server and the address-assignment pools used by the server must be configured in the same logical system and routing instance.

You cannot configure the extended DHCP local server and extended DHCP relay on the same interface.

To configure the extended DHCP local server on the router, you include the **dhcp-local-server** statement at the **[edit system services]** hierarchy level. See the "[edit system services dhcp-local-server] Hierarchy Level" on page 753 for the complete DHCP local server syntax.

This overview covers:

- Interaction Among the DHCP Client, Extended DHCP Local Server, and

Interaction Among the DHCP Client, Extended DHCP Local Server, and Address-Assignment Pools

In a typical carrier edge network configuration, the DHCP client is on the subscriber's computer, and the DHCP local server is configured on the router. The following steps provide a high-level description of the interaction among the DHCP local server, DHCP client, and address-assignment pools:

1. The DHCP client sends a discover packet to one or more DHCP local servers in the network to obtain configuration parameters and an IP address for the subscriber.
2. Each DHCP local server that receives the discover packet then searches its address-assignment pool for the client address and configuration options. Each local server creates an entry in its internal client table to keep track of the client state, then sends a DHCP offer packet to the client.
3. On receipt of the offer packet, the DHCP client selects the DHCP local server from which to obtain configuration information and sends a request packet indicating the DHCP local server that will grant the address and configuration information.
4. The selected DHCP local server sends an acknowledgement packet to the client that contains the client address lease and configuration parameters. The server also installs the host route and ARP entry, and then monitors the lease state.

Providing DHCP Client Configuration Information

When the extended DHCP application receives a response from an external authentication server, the response might include information in addition to the IP address and subnet mask. The extended DHCP application uses the information from the authentication grant for the response the DHCP application sends to the DHCP client. The DHCP application can either send the information in its original form or the application might merge the information with local configuration specifications. For example, if the authentication grant includes an address pool name and a local configuration specifies DHCP attributes for that pool, the extended DHCP application merges the authentication results and the attributes in the reply that the server sends to the client.

A local configuration is optional — a client can be fully configured by the external authentication service. However, if the external authentication service does not provide client configuration, you must configure the local address-assignment pool to provide the configuration for the client. When a local configuration specifies options, the extended DHCP application adds the local configuration options to the offer PDU the server sends to the client. If the two sets of options overlap, the options in the authentication response from the external service take precedence.

When you use RADIUS to provide the authentication, the additional information might be in the form of RADIUS attributes and Juniper Networks VSAs. Table 18 on page 86

shows the information that RADIUS might include in the authentication grant. See “RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework” on page 38 for a complete list of RADIUS attributes and Juniper Networks VSAs that the extended DHCP applications supports for subscriber access management.

Table 18: Information in Authentication Grant

Attribute Number	Attribute Name	Description
RADIUS attribute 8	Framed-IP-Address	Client IP address
RADIUS attribute 9	Framed-IP-Netmask	Subnet mask for client IP address (DHCP option 1)
Juniper Networks VSA 26-4	Primary-DNS	Primary domain server (DHCP option 6)
Juniper Networks VSA 26-5	Secondary-DNS	Secondary domain server (DHCP option 6)
Juniper Networks VSA 26-6	Primary-WINS	Primary WINS server (DHCP option 44)
Juniper Networks VSA 26-7	Secondary-WINS	Secondary WINS server (DHCP option 44)
RADIUS attribute 27	Session-Timeout	Lease time
RADIUS attribute 88	Framed-Pool	Address assignment pool name
Juniper Networks VSA 26-109	DHCP-Guided-Relay-Server	DHCP relay server

Minimal Configuration for Clients

The extended DHCP local server provides a minimal configuration to the DHCP client if the client does not have DHCP option 55 configured. The server provides the subnet mask of the address-assignment pool that is selected for the client. In addition to the subnet mask, the server provides the following values to the client if the information is configured in the selected address-assignment pool:

- **router**—A router located on the client’s subnet. This statement is the equivalent of DHCP option 3.
- **domain name**—The name of the domain in which the client searches for a DHCP server host. This is the default domain name that is appended to hostnames that are not fully qualified. This is equivalent to DHCP option 15.
- **domain name server**—A Domain Name System (DNS) name server that is available to the client to resolve hostname-to-client mappings. This is equivalent to DHCP option 6.

DHCP Local Server and Address-Assignment Pools

The extended DHCP local server enhances traditional DHCP server operation in which the client address pool and client configuration information reside on the DHCP server. With the extended DHCP local server, the client address and configuration information reside in centralized address-assignment pools, which are managed independently of the DHCP local server and which can be shared by different client applications.

The extended DHCP local server also supports advanced pool matching and the use of named address ranges. You can also configure the local server to use DHCP option 82 information in the client PDU to determine which named address range to use for a particular client. The client configuration information, which is configured in the address-assignment pool, includes user-defined options, such as boot server, grace period, and lease time.

Configuring the DHCP environment that includes the extended DHCP local server requires two independent configuration operations, which you can complete in any order. In one operation, you configure the extended DHCP local server on the router and specify how the DHCP local server determines which address-assignment pool to use. In the other operation, you configure the address-assignment pools used by the DHCP local server. The address-assignment pools contain the IP addresses, named address ranges, and configuration information for DHCP clients.

NOTE: The extended DHCP local server and the address-assignment pools used by the server must be configured in the same logical system and routing instance.

Related Documentation

- Configuring Address-Assignment Pools on page 56
- Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool To Use on page 97
- Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 89
- Using External AAA Authentication Services with DHCP on page 96
- Graceful Routing Engine Switchover on page 122
- Tracing Extended DHCP Operations on page 123
- Verifying and Managing DHCP Local Server Configuration on page 121
- Example: Minimum Extended DHCP Local Server Configuration on page 129
- Example: Extended DHCP Local Server Configuration with Optional Pool Matching on page 129

DHCPv6 Local Server Overview

The DHCPv6 local server enhances the extended DHCP local server by providing support for IPv6. When a DHCPv6 client logs in, the DHCPv6 local server uses the AAA service framework to interact with the RADIUS server. The RADIUS server, which is configured independently of DHCP, authenticates the client and supplies the IPv6 prefix and client configuration parameters.

You can configure DHCPv6 local server to communicate the following attributes to the AAA service framework and RADIUS at login time:

- Client username
- Client password

NOTE: The client username, which uniquely identifies a subscriber, must be present in the configuration in order for DHCPv6 local server to use RADIUS authentication.

Based on the attributes that the DHCPv6 local server provides, RADIUS returns the information shown in Table 19 on page 88 to configure the client:

Table 19: RADIUS Attributes and VSAs for DHCPv6 Local Server

Attribute Number	Attribute Name	Description
27	Session-Timeout	Lease time, in seconds. If not supplied, the lease does not expire
123	Delegated-IPv6-Prefix	Prefix that is delegated to the client
26-143	Max-Clients-Per-Interface	Maximum number of clients allowed per interface

The DHCPv6 local server is compatible with the extended DHCP local server and the extended DHCP relay agent, and can be enabled on the same interface as either the extended DHCP local server or DHCP relay agent.

The DHCPv6 local server provides many of the same features as the extended DHCP local server, including:

- Configuration for a specific interface or for a group of interfaces
- Site-specific usernames and passwords
- Numbered Ethernet interfaces
- Statically configured CoS and filters
- AAA directed login

NOTE: DHCPv6 local server does not support dynamic profiles or the local address-assignment pool feature, which the DHCP local server does support.

To configure the extended DHCPv6 local server on the router, you include the **dhcpv6** statement at the **[edit system services dhcp-local-server]** hierarchy level. See the "[edit system services dhcp-local-server] Hierarchy Level" on page 753 for the complete DHCP local server syntax, including the DHCPv6 syntax.

You can also include the **dhcpv6** statement at the following hierarchy levels:

- **[edit logical-systems *logical-system-name* system services dhcp-local-server]**
- **[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server]**
- **[edit routing-instances *routing-instance-name* system services dhcp-local-server]**

Related Documentation

- Extended DHCP Local Server Overview on page 84
- Using External AAA Authentication Services with DHCP on page 96
- Grouping Interfaces with Common DHCP Configurations on page 98
- Group-Specific DHCP Local Server Options on page 100
- Overriding Default DHCP Local Server Configuration Settings on page 101
- Configuring Passwords for Usernames on page 110
- Creating Unique Usernames for DHCP Clients on page 111
- Verifying and Managing DHCPv6 Local Server Configuration on page 122
- Example: Extended DHCPv6 Local Server Configuration on page 130

Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview

The router's DHCP support enables you to attach a dynamic profile to a DHCP subscriber interface. When a DHCP subscriber logs in, the router instantiates the specified dynamic profile and then applies the services defined in the profile to the interface.

You can attach dynamic profiles to all interfaces or you can specify a particular group of interfaces to which the profile is attached. Both the DHCP local server and the DHCP relay agent support the attachment of dynamic profiles to interfaces.

You can enable the following optional features when the dynamic profile is a attached. The two options cannot be used together.

- Enable multiple DHCP subscribers to share the same VLAN logical interface. The firewall filters, CoS schedulers, and IGMP configuration of the clients are merged.
- Specify the primary dynamic profile that is instantiated when the first subscriber logs in.

Multiple DHCP Subscribers Sharing the Same VLAN Logical Interface

The **aggregate-clients** statement specifies that the router merge the firewall filters, CoS schedulers, and IGMP configuration of multiple DHCP clients that are on the same VLAN logical interface (for example, multiple clients belonging to the same household). You can configure the aggregate-clients support for all interfaces or for a group of interfaces. The **aggregate-clients** statement provides the option of either merging (chaining) or replacing software components for each client.

By default, the feature is disabled and a single DHCP client is allowed per VLAN when a dynamic profile is associated with the VLAN logical interface.

When you specify the **merge** option, the router aggregates the software components for multiple subscribers as follows:

- Firewall filters—The filters are chained together using the precedence as the order of execution. If the same firewall filter is attached multiple times, the filter is executed only once.
- CoS schedulers—The different CoS schedulers are merged as if the scheduler map has multiple schedulers. The merge operation for the individual traffic-control-profiles parameters (shaping-rate, delay-buffer-rate, guaranteed-rate) preserves the maximum value for each parameter.
- IGMP configuration—The current IGMP configuration is replaced with the configuration of the newest DHCP client.

When you specify the **replace** option, the entire logical interface is replaced whenever a new client logs into the network using the same VLAN logical interface. For example, if a customer subscribes to voice, video, and data services on the network, when a voice client logs in, instead of applying a specific voice filter for only that service, the entire voice, video, and data filter chain is applied.

NOTE: You cannot use a dynamic demux interface to represent multiple subscribers in a dynamic profile attached to an interface. One dynamic demux interface represents one subscriber. Do not configure the aggregate-clients option when attaching a dynamic profile to a demux interface for DHCP.

Primary Dynamic Profile

The **use-primary** option enables you to specify the primary dynamic profile that is instantiated when the first subscriber logs in. Subsequent subscribers are not assigned the primary dynamic profile; instead, they are assigned the dynamic profile specified for the interface. When the first subscriber logs out, the next subscriber that logs in is assigned the primary dynamic profile.

This feature can conserve logical interfaces in a network where dynamic IP demux interfaces are used to represent subscribers. To conserve interfaces, the primary profile that you specify should not be a profile that creates a demux interface but one that provides the initial policies for the primary interface subscriber.

Related Documentation

- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109

CHAPTER 7

Configuring DHCP Local Server

- Verifying and Managing DHCP Local Server Configuration on page 121
- Verifying and Managing DHCPv6 Local Server Configuration on page 122
- Graceful Routing Engine Switchover on page 122
- Tracing Extended DHCP Operations on page 123

DHCP Duplicate Client Differentiation Using Client Subinterface Overview

In some network environments, client IDs and MAC addresses might not be unique, resulting in duplicate clients. For example, two network adapters might be manufactured with the same hardware address, resulting in a duplicate MAC address among the DHCP clients attached to the router. A duplicate DHCP client occurs when a client attempts to get a lease, and that client has the same client ID or the same MAC address as an existing DHCP client.

When DHCP server receives a request from a new client that has a duplicate ID or MAC address, DHCP server terminates the address lease for the existing client and returns the address to its original address pool. DHCP server then assigns a new address and lease to the new client.

By default, both DHCP local server and DHCP relay use the subnet information to differentiate between duplicate clients. However, in some cases, this level of differentiation is not adequate. For example, when multiple subinterfaces share the same underlying loopback interface with the same preferred source address, the interfaces appear to be on the same subnet. In this situation, the default configuration prevents duplicate clients.

You can provide greater differentiation between duplicate clients by configuring DHCP to consider the client subinterface when duplicate clients occur. In this optional configuration, DHCP uniquely identifies:

- The subnet on which the client resides
- The subinterface on which the client resides
- The client within the subnet

Related Documentation

- Configuring DHCP Duplicate Client Support on page 95
- Guidelines for Configuring Support for DHCP Duplicate Clients on page 94

Guidelines for Configuring Support for DHCP Duplicate Clients

This topic describes the guidelines for configuring DHCP to include the client subinterface in order to distinguish between duplicate clients (clients with the same MAC address or client ID) in a subscriber access environment.

When configuring DHCP duplicate client support, consider the following guidelines:

- The optional DHCP duplicate client support feature is used for DHCPv4 clients. For DHCPv6, client identification is independent of MAC address.

- For DHCP relay agent configuration:
  - DHCP relay must be configured to insert option 82, regardless of whether or not the incoming packet has option 82.
  - Option 82 must include the Agent Circuit ID suboption (suboption 1).
  - Option 82 must be the interface name, not the interface description.
  - DHCP server must echo option 82 in the server's reply. This is required because of the following:
    - The giaddr inserted by DHCP relay is the same for duplicate clients on different subinterfaces. The DHCP local server uses option 82 when allocating the IP address.
    - DHCP relay uses the echoed option 82 to learn the client subinterface and to construct the client key.
- For the Layer 3 wholesale model:
  - The wholesaler and retailer logical system/routing instances must have the same **duplicate-clients-on-interface** statement configuration.
  - For DHCP relay, the wholesaler and the retailer routing contexts must both be configured with the Agent Circuit ID suboption (suboption 1) in option 82.

Related Documentation

- DHCP Duplicate Client Differentiation Using Client Subinterface Overview on page 94
- Configuring DHCP Duplicate Client Support on page 95

Configuring DHCP Duplicate Client Support

You can optionally configure DHCP local server and DHCP relay to include a client subinterface when distinguishing between two clients that have the same MAC address or client ID. The configuration is a global setting for each logical system/routing instance.

To configure DHCP local server to include the client subinterface:

1. Specify that you want to configure DHCP local server.

   ```
   [edit system services]
   user@host# edit dhcp-local-server
   ```

2. Configure the optional duplicate client support.

   ```
   [edit system services dhcp-local-server]
   user@host# set duplicate-clients-on-interface
   ```

To configure DHCP relay agent to include the client subinterface:

1. Specify that you want to configure DHCP relay agent.

   ```
   [edit forwarding-options]
   user@host# edit dhcp-relay
   ```

2. Configure the optional duplicate client support.

```
[edit system services dhcp-relay]
user@host# set duplicate-clients-on-interface
```

Related Documentation

- DHCP Duplicate Client Differentiation Using Client Subinterface Overview on page 94
- Guidelines for Configuring Support for DHCP Duplicate Clients on page 94

Using External AAA Authentication Services with DHCP

The extended DHCP local server, including DHCPv6 local server, and the extended DHCP relay agent support the use of external AAA authentication services, such as RADIUS, to authenticate DHCP clients. When the extended DHCP local server or relay agent receives a discover PDU from a client, the extended DHCP application contacts the AAA server to authenticate the DHCP client. The extended DHCP application can obtain client addresses and DHCP configuration options from the external AAA authentication server.

NOTE: This section uses the term *extended DHCP application* to refer to both the extended DHCP local server and the extended DHCP relay agent.

The external authentication feature also supports AAA directed logout. If the external AAA service supports a user logout directive, the extended DHCP application honors the logout and responds as though it were requested by a CLI management command. All of the client state information and allocated resources are deleted at logout. The extended DHCP application supports directed logout using the list of configured authentication servers you specify with the **authentication-server** statement at the **[edit access profile *profile-name*]** hierarchy level.

You can configure either global authentication support or group-specific support.

You must configure the **username-include** statement to enable the use of authentication. The **password** statement is not required and does not cause DHCP to use authentication if the **username-include** statement is not included.

To configure DHCP local server and DHCP relay agent authentication support:

1. Specify that you want to configure authentication options.
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# edit authentication
     ```

   - For DHCP relay agent:

     ```
     [edit forwarding-options dhcp-relay]
     user@host# edit authentication
     ```

   - For DHCPv6 local server:

     ```
     [edit system services dhcp-local-server dhcpv6]
     user@host# edit authentication
     ```

2. (Optional) Configure a password that authenticates the username to the external authentication service.

   See “Configuring Passwords for Usernames” on page 110.

3. (Optional) Configure optional features to create a unique username.

   See “Creating Unique Usernames for DHCP Clients” on page 111.

Related Documentation

- Extended DHCP Local Server Overview on page 84
- Extended DHCP Relay Agent Overview on page 136
- DHCPv6 Local Server Overview on page 88

Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool To Use

You can specify the match order in which the extended DHCP local server uses the client data to determine the address-assignment pool that provides the IP address and configuration for a DHCP client. You use the **pool-match-order** statement to specify the match order. If you do not specify the **pool-match-order**, the router uses the default **ip-address-first** matching to select the address pool. Once DHCP local server determines the address assignment pool to use, the server performs the matching based on the criteria you specified in the pool configuration.

In the default **ip-address-first** matching, the server selects the address-assignment pool to use by matching the IP address in the client DHCP request with the network address of the address-assignment pool. If the client request contains the gateway IP address (giaddr), the local server matches the giaddr to the address-assignment pool’s address. If there is no giaddr in the request, then the DHCP local server matches the IP address of the receiving interface to the address of the address-assignment pool.

In **external-authority** matching, the DHCP local server receives the address assignment from an external authority, such as RADIUS or Diameter. If RADIUS is the external authority, the DHCP local server uses, the Framed-IPv6-Pool attribute (RADIUS attribute 100) select the pool. If Diameter is the external authority, the server uses the Diameter counterpart of the Framed-IPv6-Pool attribute to determine the pool.

For IPv4 address-assignment pools, you can optionally configure the extended DHCP local server to match the DHCP relay agent information option (option 82) in the client DHCP packets to a named range in the address-assignment pool used for the client. Named ranges are subsets within the overall address-assignment pool address range, which you can configure when you create the address-assignment pool.

NOTE: To use the DHCP local server option 82 matching feature with an IPv4 address-assignment pool, you must ensure that the option-82 statement is included in the dhcp-attributes statement for the address-assignment pool.

To configure the matching order the extended DHCP local server uses to determine the address-assignment pool used for a client:

1. Access the **pool-match-order** configuration.

   ```
   [edit system services dhcp-local-server]
   user@host# edit pool-match-order
   ```

2. Specify the pool matching methods in the order in which the router performs the methods. You can specify the methods in any order. All methods are optional—the router uses the **ip-address-first** method by default.

   a. Configure the router to use an external addressing authority.

      ```
      [edit system services dhcp-local-server pool-match-order]
      user@host# set external-authority
      ```

   b. Configure the router to use the ip-address-first method.

      ```
      [edit system services dhcp-local-server pool-match-order]
      user@host# set ip-address-first
      ```

   c. (IPv4 address-assignment pools only) Specify the option 82 matching method.

      ```
      [edit system services dhcp-local-server pool-match-order]
      user@host# set option-82
      ```

Related Documentation

- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56
- Extended DHCP Local Server Overview on page 84
- Example: Extended DHCP Local Server Configuration with Optional Pool Matching on page 129

Grouping Interfaces with Common DHCP Configurations

You use the group feature to group together a set of interfaces and then apply a common DHCP configuration to the named interface group. The extended DHCP local server, including the DHCPv6 local server, and DHCP relay agent both support interface groups.

To configure an interface group:

1. Access the **[edit system services dhcp-local-server]** hierarchy (for DHCP local server) or the **[edit forwarding-options dhcp-relay]** hierarchy (for DHCP relay agent), depending on the extended DHCP access method you want to configure. The following steps create a DHCP local server group; the steps are the same for the DHCPv6 local server, and DHCP relay agent.

2. Create the group and assign a name.

   ```
   [edit system services dhcp-local-server]
   user@host# edit group boston
   ```

3. Specify the names of one or more interfaces on which the extended DHCP application is enabled. You can repeat the **interface** ***interface-name*** statement to specify multiple interfaces within the group, but you cannot use the same interface in more than one group.

   ```
   [edit system services dhcp-local-server group boston]
   user@host# set interface fe-1/0/1.1
   user@host# set interface fe-1/0/1.2
   ```

4. (Optional) You can use the ***upto*** option to specify a range of interfaces for a group.

   ```
   [edit system services dhcp-local-server group boston]
   user@host# set interface fe-1/0/1.3 upto fe-1/0/1.9
   ```

5. (Optional) You can use the **exclude** option to exclude a specific interface or a specified range of interfaces from the group. For example:

   ```
   [edit system services dhcp-local-server group boston]
   user@host# interface fe-1/0/1.1 upto fe-1/0/1.102
   user@host# interface fe-1/0/1.6 exclude
   user@host# interface fe-1/0/1.70 upto fe-1/0/1.80 exclude
   ```

Related Documentation

- Extended DHCP Local Server Overview on page 84
- Extended DHCP Relay Agent Overview on page 136
- DHCPv6 Local Server Overview on page 88
- Group-Specific DHCP Local Server Options on page 100
- Group-Specific DHCP Relay Options on page 149
- Guidelines for Configuring Interface Ranges on page 99

Guidelines for Configuring Interface Ranges

This topic describes guidelines that you should consider when configuring interface ranges for named interface groups for DHCP local server and DHCP relay. The guidelines refer to the following configuration statement:

```
user@host# set interface interface-name upto upto-interface-name
```

- The start subunit, **interface** ***interface-name*** , serves as the key for the stanza. The remaining configuration settings are considered attributes.
- If the subunit is not included, an implicit **.0** subunit is enforced. The implicit subunit is applied to all interfaces when autoconfiguration is enabled. For example, **interface ge-2/2/2** is treated as **interface ge-2/2/2.0**.
- Ranged entries contain the **upto** keyword, and the configuration applies to all interfaces within the specified range. The start of a ranged entry must be less than the end of the range. Discrete entries apply to a single interface, except in the case of autoconfiguration, in which a **0** (zero) subunit acts as a wildcard.
- Interface stanzas defined within the same router context are dependent and can constrain each other—both DHCP local server and DHCP relay are considered. Interface

stanzas defined across different router contexts are independent and do not constrain one another.

- Each interface stanza, whether discrete or ranged, has a unique start subunit across a given router context. For example, the following configuration is not allowed within the same group because **ge-1/0/0.10** is the start subunit for both.

  ```
  interface ge-1/0/0.10 upto ge-1/0/0.30
  interface ge-1/0/0.10
  ```

- Two groups cannot share interface space. For example, the following configuration is not allowed because the three stanzas share the same space and interfere with one another—interface **ge-1/0/0.26** is a common to all three.

  ```
  dhcp-relay group diamond interface ge-1/0/0.10 upto ge-1/0/0.30
  dhcp-local-server group ruby interface ge-1/0/0.26
  dhcp-relay group sapphire interface ge-1/0/0.25 upto ge-1/0/0.35
  ```

- Two ranges cannot overlap, either within a group or across groups. Overlapping occurs when two interface ranges share common subunit space but neither range is a proper subset of the other. The following ranges overlap:

  ```
  interface ge-1/0/0.10 upto ge-1/0/0.30
  interface ge-1/0/0.20 upto ge-1/0/0.40
  ```

- A range can contain multiple nested ranges. Nested ranges are ranges in which one range is a proper subset of another range. When ranges are nested, the smallest matching range applies.

  In the following example, the three ranges nest properly:

  ```
  interface ge-1/0/0.10 upto ge-1/0/0.30
  interface ge-1/0/0.12 upto ge-1/0/0.15 exclude
  interface ge-1/0/0.25 upto ge-1/0/0.29 exclude
  ```

- Discrete interfaces take precedence over ranges. In the following example, interface **ge-1/0/0.20** takes precedence and enforces an interface client limit of **5**.

  ```
  interface ge-1/0/0.10 upto ge-1/0/0.30
  interface ge-1/0/0.15 upto ge-1/0/0.25 exclude
  interface ge-1/0/0.20 overrides interface-client-limit 5
  ```

Related Documentation

- Grouping Interfaces with Common DHCP Configurations on page 98

Group-Specific DHCP Local Server Options

You can include the following statements at both the **[edit system services dhcp-local-server group *group-name*]** hierarchy level to set group-specific DHCP local server configuration options, and at the **[edit system services dhcp-local-server]** hierarchy level to set global DHCP local server configuration options:

- **authentication**—Configure the parameters the router sends to the external AAA server.
- **dynamic-profile**—Specify the dynamic profile that is attached to a group of interfaces.

- **interface**—Specify one or more interfaces, or a range of interfaces, that are within the specified group.
- **overrides**—Override the default configuration settings for the extended DHCP local server. For information, see "Overriding Default DHCP Local Server Configuration Settings" on page 101.

The DHCPv6 local server supports the same set of statements with the exception of the **dynamic-profile** statement.

The statements configured at the **[edit system services dhcp-local-server group *group-name*]** hierarchy level apply only to the named group of interfaces, and override any global DHCP local server settings configured with the same statements at the **[edit system services dhcp-local-server]** hierarchy level.

Related Documentation

- Grouping Interfaces with Common DHCP Configurations on page 98

Overriding Default DHCP Local Server Configuration Settings

Subscriber management enables you to override certain default DHCP and DHCPv6 local server configuration settings. You can override settings at the global level, for a named group of interfaces, or for a specific interface within a named group.

- To override global default DHCP local server configuration options, include the **overrides** statement and its subordinate statements at the **[edit system services dhcp-local-server]** or **[edit system services dhcp-local-server dhcpv6]** hierarchy level.
- To override DHCP local server configuration options for a named group of interfaces, include the statements at the **[edit system services dhcp-local-server group *group-name*]** or **[edit system services dhcp-local-server dhcpv6 group]** hierarchy level.
- To override DHCP local server configuration options for a specific interface within a named group of interfaces, include the statements at the **[edit system services dhcp-local-server group *group-name* interface]** or **[edit system services dhcp-local-server dhcpv6 group *group-name* interface]** hierarchy level.

To override default DHCP local server configuration settings:

1. Specify that you want to configure override options.

   Global override:

   ```
   [edit system services dhcp-local-server]
   user@host# edit overrides
   ```

   Group level override:

   ```
   [edit system services dhcp-local-server]
   user@host# edit group boston overrides
   ```

   Per-interface override:

   ```
   [edit system services dhcp-local-server]
   user@host# edit group boston overrides interface fe-1/0/1.1
   ```

2. (Optional) Override the maximum number of DHCP clients allowed per interface.

   See “Specifying the Maximum Number of DHCP Clients Per Interface” on page 102.

3. (Optional) Override ARP table population in distrusted environments.

   See “Disabling ARP Table Population” on page 103.

4. (Optional) Configure DHCP client auto logout.

   See “Automatically Logging Out DHCP Clients” on page 107.

5. (Optional) Delete DHCP override settings.

   See “Deleting DHCP Local Server and DHCP Relay Override Settings” on page 108.

Related Documentation

- Group-Specific DHCP Local Server Options on page 100
- Deleting DHCP Local Server and DHCP Relay Override Settings on page 108

Specifying the Maximum Number of DHCP Clients Per Interface

By default, there is no limit to the number of DHCP local server or DHCP relay clients allowed on an interface. However, you can override the default setting and specify the maximum number of clients allowed per interface, in the range 1 through 500,000. When the number of clients on the interface reaches the specified limit, no additional DHCP Discover PDUs or DHCPv6 Solicit PDUs are accepted. When the number of clients subsequently drops below the limit, new clients are again accepted.

NOTE: The maximum number of DHCP (and DHCPv6) local server clients or DHCP relay clients can also be specified by Juniper Networks VSA 26-143 during client login. The VSA-specified value always takes precedence if the interface-client-limit number statement specifies a different number.

If the VSA-specified value differs with each client login, DHCP uses the largest limit set by the VSA until there are no clients on the interface.

To configure the maximum number of DHCP clients allowed per interface:

1. Specify that you want to configure override options.

   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# edit overrides
     ```

   - For DHCPv6 local server:

     ```
     [edit system services dhcp-local-server dhcpv6]
     user@host# edit overrides
     ```

   - For DHCP relay agent:

     ```
     [edit forwarding-options dhcp-relay]
     user@host# edit overrides
     ```

2. Configure the maximum number of clients allowed per interface. (DHCP local server, DHCPv6 local server, and DHCP relay agent all support the **interface-client-limit** statement.)

   ```
   [edit system services dhcp-local-server overrides]
   user@host# set interface-client-limit number
   ```

Related Documentation

- Overriding Default DHCP Local Server Configuration Settings on page 101
- Deleting DHCP Local Server and DHCP Relay Override Settings on page 108
- Extended DHCP Local Server Overview on page 84
- Extended DHCP Relay Agent Overview on page 136

Disabling ARP Table Population

By default, DHCP populates the ARP table with the MAC address of a client when the client binding is established. However, you may choose to use the DHCP **no-arp** statement to hide the subscriber MAC address information, as it appears in ARP table entries.

When running in a trusted environment (that is, when not using the **no-arp** statement), DHCP populates the ARP table with unique MAC addresses contained within the DHCP PDU for each DHCP client:

Table 20: ARP Table in Trusted Environment

IP Address	MAC Address
Client 1 IP Address	MAC *A*
Client 2 IP Address	MAC *B*
Client 3 IP Address	MAC *C*

In distrusted environments, you can specify the **no-arp** statement to hide the MAC addresses of clients. When you specify the **no-arp** statement, DHCP does not automatically populate the ARP table with MAC address information from the DHCP PDU for each client. Instead, the system performs an ARP to obtain the MAC address of each client and obtains the MAC address of the immediately-attached device (for example, a DSLAM). DHCP populates the ARP table with the same interface MAC address (for example, MAC *X* from a DSLAM interface) for each client:

Table 21: ARP Table in Distrusted Environment

IP Address	MAC Address
Client 1 IP Address	MAC *X*
Client 2 IP Address	MAC *X*
Client 3 IP Address	MAC *X*

To disable ARP table population:

1. Specify that you want to configure override options.
   - For DHCP local server:

     [edit system services dhcp-local-server]
     user@host# edit overrides

   - For DHCP relay:

     [edit forwarding-options dhcp-relay]
     user@host# edit overrides

2. Disable ARP table population with client-specific information. (DHCP local server and DHCP relay agent both support the **no-arp** statement.)
   - For DHCP local server:

     [edit system services dhcp-local-server overrides]
     user@host# set no-arp

   - For DHCP relay:

     [edit forwarding-options dhcp-relay overrides]
     user@host# set no-arp

Related Documentation

- Overriding Default DHCP Local Server Configuration Settings on page 101
- Deleting DHCP Local Server and DHCP Relay Override Settings on page 108
- Extended DHCP Local Server Overview on page 84
- DHCPv6 Local Server Overview on page 88
- Extended DHCP Relay Agent Overview on page 136
- Deleting DHCP Local Server and DHCP Relay Override Settings on page 108

Configuring DHCP Snooped Packets Forwarding Support for DHCP Local Server

You can configure how DHCP local server handles DHCP snooped packets. Depending on the configuration, DHCP local server either forwards or drops the snooped packets it receives.

Table 22 on page 105 shows the action the router takes for DHCP local server snooped packets.

NOTE: Configured interfaces are those interfaces that have been configured with the group statement in the [edit system services dhcp-loal-server] hierarchy. Non-configured interfaces are those that are in the logical system/routing instance but have not been configured by the group statement.

Table 22: Actions for DHCP Local Server Snooped Packets

forward-snooped-clients Configuration	Action on Configured Interfaces	Action on Non-Configured Interfaces
forward-snooped-clients not configured	dropped	dropped
all-interfaces	forwarded	forwarded
configured-interfaces	forwarded	dropped
non-configured-interfaces	dropped	forwarded

To configure DHCP snooped packet forwarding for DHCP local server:

1. Specify that you want to configure DHCP local server.

   ```
   [edit]
   user@host# edit system services dhcp-local-server
   ```

2. Enable DHCP snooped packet forwarding for DHCP local server.

   ```
   [edit system services dhcp-local-server]
   user@host# edit forward-snooped-clients
   ```

3. Specify the interfaces that are supported for snooped packet forwarding.

   ```
   [edit system services dhcp-local-server forward-snooped-clients]
   user@host# set (all-interfaces | configured-interfaces | non-configured-interfaces)
   ```

For example, to configure DHCP local server to forward DHCP snooped packets on only configured interfaces:

```
[edit]
system {
  services {
    dhcp-local-server {
      forward-snooped-clients configured-interfaces;
    }
  }
}
```

Related Documentation

- Managing DHCP Snooping Support on page 156

DHCP Auto Logout Overview

This topic provides an introduction to the optional DHCP auto logout feature and includes the following sections:

Auto Logout Overview

Auto logout is an optional configuration for DHCP local server and DHCP relay agent that improves the efficiency of DHCP IP address assignment. Auto logout enables IP addresses to be immediately released and returned to the address pool when the addresses are no longer used by DHCP clients. DHCP can then assign the addresses to other clients. Without auto logout, an IP address is blocked for the entire lease period, and DHCP must wait until the address lease time expires before reusing the address.

Auto logout is particularly useful when DHCP uses long lease times for IP address assignments and to help avoid allocating duplicate IP addresses for a single client. For example, you might have an environment that includes set-top boxes (STB) that are often upgraded or replaced. Each time a STB is changed, the new STB repeats the DHCP discover process to obtain client configuration information and an IP address. DHCP views the new STB as a completely new client and assigns a new IP address—the previous IP address assigned to the client (the old STB) remains blocked and unavailable until the lease expires. If auto logout is configured in this situation, DHCP recognizes that the new STB is actually the same client and then immediately releases the original IP address. DHCP relay agent acts as a proxy client for auto logout and sends a DHCP release message to the DHCP server.

How DHCP Identifies and Releases Clients

The auto logout feature requires that DHCP explicitly identify clients. By default, DHCP local server and DHCP relay agent identify clients based on MAC address or Client Identifier. However, in some cases this type of identification might not be sufficient. For example, in the previous STB example, each STB has a different MAC address, so DHCP incorrectly assumes that an upgraded or replacement STB is a new client.

In order to explicitly identify clients, auto logout uses a secondary identification method when the primary identification method is unsuccessful—the primary method is considered unsuccessful if the MAC address or Client Identifier does not match that of an existing client. The secondary identification method is based on the DHCP option 60 and option 82 information in DHCP discover messages.

Both the primary and secondary identification methods use subnet information to differentiate between clients. The primary identification method differentiates between two clients with the same MAC address (or same Client Identifier) if the clients are on different subnets. Similarly, the secondary identification method considers two clients as different if they have the same option 60 and option 82 information, but different subnets.

DHCP local server and DHCP relay agent perform the following operations when auto logout is enabled and the secondary identification method identifies a duplicate client (that is, the discovery packet is from an existing client).

- DHCP local server immediately releases the existing address.
- DHCP relay agent immediately releases the existing client and then sends a DHCP release packet to the DHCP server. Sending the release packet ensures that DHCP relay and the DHCP server are synchronized.

NOTE: If the DHCP relay agent is in snoop mode, DHCP relay releases the client but does not send a release packet to the DHCP server if the discover packet is for a passive client (a client added as a result of snooped packets) or if the discover packet is a snooped packet.

Option 60 and Option 82 Requirements

DHCP local server requires that the received discover packet include both DHCP option 60 and option 82. If either option is missing, DHCP local server cannot perform the secondary identification method and auto logout is not used.

DHCP relay agent requires that the received discover packet contain DHCP option 60. DHCP relay determines the option 82 value based on the guidelines provided in "DHCP Relay Agent Option 82 Value for Auto Logout" on page 164.

Related Documentation

- Automatically Logging Out DHCP Clients on page 107
- DHCP Relay Agent Option 82 Value for Auto Logout on page 164

Automatically Logging Out DHCP Clients

You can configure the extended DHCP local server and extended DHCP relay to automatically log out DHCP clients. Auto logout immediately releases an existing client when DHCP receives a discover packet that has the same DHCP option 60 and DHCP option 82 information as the existing client. DHCP then releases the existing client IP address without waiting for the normal lease expiration.

NOTE: When the existing client is released, the new client undergoes the normal authentication process. The new client might not receive the same IP address as the original client.

To configure DHCP client auto logout:

1. Specify that you want to configure override options.
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# edit overrides
     ```

   - For DHCP relay agent:

     ```
     [edit forwarding-options dhcp-relay]
     user@host# edit overrides
     ```

2. Enable auto logout. (DHCP local server and DHCP relay agent both support the **client-discover-match** statement.)
   - For DHCP local server:

```
[edit system services dhcp-local-server overrides]
user@host# set client-discover-match
```

- For DHCP relay:

```
[edit forwarding-options dhcp-relay overrides]
user@host# set client-discover-match
```

NOTE: If you change the auto logout configuration, existing clients continue to use the auto logout setting that was configured when they logged in. New clients use the new setting.

Related Documentation

- DHCP Auto Logout Overview on page 105
- Deleting DHCP Local Server and DHCP Relay Override Settings on page 108
- Extended DHCP Local Server Overview on page 84
- Extended DHCP Relay Agent Overview on page 136

Deleting DHCP Local Server and DHCP Relay Override Settings

You can delete override settings for DHCP local server and DHCP relay globally, for a named group, or for a specific interface within a named group. You can delete a specific override setting or all overrides.

- To delete a specific DHCP override setting at a particular hierarchy level, include the **overrides** statement with the appropriate subordinate statements. For example, to delete the DHCP local server override **no-arp** setting for a group named **marin20**:

```
[edit system services dhcp-local-server]
user@host# delete group marin20 overrides no-arp
```

- To delete all DHCP override settings at a hierarchy level, include the **overrides** statement without any subordinate statements. For example, to delete all DHCP relay overrides for interface **fxp0.0**, which is in group **marin20**:

```
[edit forwarding-options dhcp-relay]
user@host# delete group marin20 interface fxp0.0 overrides
```

Related Documentation

- Overriding Default DHCP Local Server Configuration Settings on page 101
- Extended DHCP Local Server Overview on page 84
- Extended DHCP Relay Agent Overview on page 136

Attaching Dynamic Profiles to DHCP Subscriber Interfaces

This topic describes how to attach a dynamic profile to a DHCP subscriber interface. When a DHCP subscriber logs in, the specified dynamic profile is instantiated and the services defined in the profile are applied to the interface.

This topic contains the following sections:

Attaching a Dynamic Profile to All DHCP Subscriber Interfaces

To attach a dynamic profile to all DHCP subscriber interfaces:

1. At the DHCP configuration hierarchy, use the **dynamic-profile** statement to specify the name of the dynamic profile to attach to all interfaces.
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# set dynamic-profile vod-profile-22
     ```

   - For DHCP relay agent:

     ```
     [edit forwarding-options dhcp-relay]
     user@host# set dynamic-profile vod-profile-west
     ```

2. Optionally, you can configure the attribute to use when attaching the specified profile.

   You can include either the **aggregate-clients** option to enable multiple DHCP subscribers to share the same VLAN logical interface, or the **use-primary** option to specify that the primary dynamic profile is used. The **aggregate-clients** option does not apply to demux subscriber interfaces. The two options are mutually exclusive.

   - To enable multiple subscribers to share the same VLAN logical interface:

     ```
     [edit system services dhcp-local-server dynamic-profile]
     user@host# set aggregate-clients merge
     ```

   - To use the primary dynamic profile:

     ```
     [edit forwarding-options dhcp-relay dynamic-profile]
     user@host# set use-primary subscriber_profile
     ```

Attaching a Dynamic Profile to a Group of DHCP Subscriber Interfaces

To attach a dynamic profile to a group of interfaces:

Before you begin:

- Configure the interface group.

  See "Grouping Interfaces with Common DHCP Configurations" on page 98.

1. At the DHCP configuration hierarchy, specify the name of the interface group and the dynamic profile to attach to the group.
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# set group boston dynamic-profile vod-profile-42
     ```

   - For DHCP relay agent:

     ```
     [edit forwarding-options dhcp-relay]
     user@host# set group quebec dynamic-profile vod-profile-east
     ```

2. Optionally, you can configure the attribute to use when attaching the specified profile.

   You can include either the **aggregate-clients** option to enable multiple DHCP subscribers to share the same VLAN logical interface, or the **use-primary** option to specify that the primary dynamic profile is used. The **aggregate-clients** option does not apply to demux subscriber interfaces. The two options are mutually exclusive.

   - To enable multiple subscribers to share the same VLAN logical interface:

     ```
     [edit system services dhcp-local-server dynamic-profile]
     user@host# set aggregate-clients merge
     ```

   - To use the primary dynamic profile:

     ```
     [edit forwarding-options dhcp-relay dynamic-profile]
     user@host# set use-primary subscriber_profile
     ```

Related Documentation

- Dynamic Profiles Overview on page 325
- Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 89
- Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces on page 411

Configuring Passwords for Usernames

You can configure an optional password that the extended DHCP application presents to the external AAA authentication service to authenticate the specified username.

To configure a password that authenticates the username:

1. Specify that you want to configure authentication options.
   - For DHCP local server:

```
[edit system services dhcp-local-server]
user@host# edit authentication
```

- For DHCPv6 local server:

```
[edit system services dhcp-local-server dhcpv6]
user@host# edit authentication
```

- For DHCP relay agent:

```
[edit forwarding-options dhcp-relay]
user@host# edit authentication
```

2. Configure the password. (DHCP local server, DHCPv6 local server, and DHCP relay agent all support the **password** statement.)

```
[edit system services dhcp-local-server authentication]
user@host# set password myPassworD1234
```

Related Documentation

- Extended DHCP Local Server Overview on page 84
- DHCPv6 Local Server Overview on page 88
- Extended DHCP Relay Agent Overview on page 136
- Using External AAA Authentication Services with DHCP on page 96
- For information about supported characters in passwords, see "Configuring Special Requirements for Plain-Text Passwords" in the *Junos OS System Basics Configuration Guide*

Creating Unique Usernames for DHCP Clients

You can configure the extended DHCP application to include additional information in the username that is passed to the external AAA authentication service when the DHCP client logs in. This additional information enables you to construct usernames that uniquely identify subscribers.

NOTE: If you do not include a username in the authentication configuration, the router does not perform authentication; however, the IP address is provided by the local pool if it is configured.

When you use the DHCPv6 local server, you must configure authentication and the client username; otherwise client login fails.

The following list describes the optional information that you can include as part of the username:

- **circuit-type**—The circuit type used by the DHCP client, for example **enet**.
- **client-id**—The client identifier option (option 1). (DHCPv6 local server only)

- **delimiter**—The delimiter character that separates components that make up the concatenated username. The default delimiter is a period (.). The semicolon (;) is not supported as a delimiter character.
- **domain-name**—The client domain name as a string. The router adds the @ delimiter to the username.
- **logical-system-name**—The name of the logical system, if the receiving interface is in a logical system.
- **mac-address**—The client MAC address, in a string of the format ***xxxx.xxxx.xxxx***. (Not supported for DHCPv6 local server)
- **option-60**—The portion of the option 60 payload that follows the length field. (Not supported for DHCPv6 local server)
- **option-82 <circuit-id> <remote-id>**—The specified contents of the option 82 payload. (Not supported for DHCPv6 local server)
  - **circuit-id**—The payload of the Agent Circuit ID suboption.
  - **remote-id**—The payload of the Agent Remote ID suboption.
  - Both **circuit-id** and **remote-id**—The payloads of both suboptions, in the format: **circuit-id[delimiter]remote-id**.
  - Neither **circuit-id** or **remote-id**—The raw payload of the option 82 from the PDU is concatenated to the username.

NOTE: For DHCP relay agent, the option 82 value used in creating the username is based on the option 82 value that is encoded in the outgoing (relayed) PDU.

- **relay-agent-interface-id**—The Interface-ID option (option 18). (DHCPv6 local server only)
- **relay-agent-remote-id**—The DHCPv6 Relay Agent Remote-ID option (option 37). (DHCPv6 local server only)
- **relay-agent-subscriber-id**—The DHCPv6 Relay Agent Subscriber-ID option (option 38). (DHCPv6 local server only)
- **routing-instance-name**—The name of the routing instance, if the receiving interface is in a routing instance.
- **user-prefix**—A string indicating the user prefix.

The router creates the unique username by including the specified additional information in the following order, with the fields separated by a delimiter.

For DHCP local server and DHCP relay agent:

```
user-prefix[delimiter]mac-address[delimiter]logical-system-name[delimiter]
routing-instance-name[delimiter]circuit-type[delimiter]option-82[delimiter]
option-60@domain-name
```

For DHCPv6 local server:

```
user-prefix[delimiter]logical-system-name[delimiter]routing-instance-name[delimiter]
circuit-type[delimiter]relay-agent-remote-id[delimiter]
relay-agent-subscriber-id[delimiter]relay-agent-interface-id[delimiter]client-id@domain-name
```

To configure a unique username:

1. Specify that you want to configure authentication.
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# edit authentication
     ```

   - For DHCPv6 local server:

     ```
     [edit system services dhcp-local-server dhcpv6]
     user@host# edit authentication
     ```

   - For DHCP relay agent:

     ```
     [edit forwarding-options dhcp-relay]
     user@host# edit authentication
     ```

2. Specify that you want to include optional information in the username. (DHCP local server, DHCPv6 local server, and DHCP relay agent all support the **username-include** statement.)

   ```
   [edit system services dhcp-local-server authentication]
   user@host# set username-include
   ```

3. (Optional) Specify the optional information you want to include in the username.

   ```
   [edit system services dhcp-local-server authentication username-include]
   user@host# set username-include circuit-type
   user@host# set username-include domain-name isp55.com
   user@host# set username-include mac-address
   user@host# set username-include user-prefix wallybrown
   ```

   The previous **username-include** configuration produces this unique username:

   wallybrown.0090.1a01.1234.enet@isp55.com

Related Documentation

- Extended DHCP Local Server Overview on page 84
- DHCPv6 Local Server Overview on page 88
- Extended DHCP Relay Agent Overview on page 136
- Using External AAA Authentication Services with DHCP on page 96

Understanding Dynamic Reconfiguration of Extended DHCP Local Server Clients

Dynamic reconfiguration of clients enables the extended DHCP local server to initiate a client update without waiting for the client to initiate a request.

Default Client/Server Interaction

Typically the DHCP client initiates all of the basic DHCP client/server interactions. The DHCP server sends information to a client only in response to a request from that client. In subscriber management scenarios, this behavior does not enable a client to be quickly updated with its network address and configuration in the event of server changes.

For example, suppose a service provider restructured its addressing scheme or changed the server IP addresses that it provided to clients. Without dynamic reconfiguration, the service provider typically clears the DHCP server binding table, but cannot inform the DHCP clients that their bindings have been cleared. Consequently, the DHCP client operates as though its IP address is still valid, but it is now unable to communicate over the access network, resulting in an outage. The DHCP local server has to wait for the client to send a message to renew its lease or rebind to the server. In response, the server sends a NAK message to the client to force it to begin the DHCP connection process again. Alternatively, the provider can wait for customers to make a service call about the network failures and then instruct them to power cycle their customer premises equipment to reinitiate the connection. Neither of these actions is timely or convenient for customers.

Dynamic Client/Server Interaction for DHCPv4

Dynamic reconfiguration for DHCPv4 is available through a partial implementation of RFC 3203, *DHCP Reconfigure Extension* for DHCPv4. It enables the DHCPv4 local server to send a message to the client to force reconfiguration.

The server sends a forcerenew message to a DHCPv4 client, initiating a message exchange. In response, DHCPv4 clients that support the forcerenew message then send a lease renewal message to the server. The server rejects the lease renewal request and sends a NAK to the client, causing the client to reinitiate the DHCP connection. A successful reconnection results in the reconfiguration of the DHCP client. Only the exchange of forcerenew, renew, and NAK messages is supported from RFC 3202. DHCP relay and DHCP relay proxy do not participate in the client reconfiguration or react to forcerenew messages other than to forward them to the client.

When the local server state machine starts the reconfiguration process on a bound client, the client transitions to the reconfiguring state and the local server sends a forcerenew message to the client. Because the client was in the bound state before entering the reconfiguring state, all subscriber services, such as forwarding and statistics, continue to work. Client statistics are not maintained in the interval between a successful reconfiguration and the subsequent client binding. When the server responds to the client renewal request with a NAK, the client entry is removed from the binding table and final statistics are reported. New statistics are collected when the client sends a discover message to establish a new session.

Dynamic Client/Server Interaction for DHCPv6

Dynamic reconfiguration for DHCPv6 is available through a partial implementation of RFC 3315, *Dynamic Host Configuration Protocol for IPv6 (DHCPv6)*. It enables the DHCPv6 local server to send a message to the client to force reconfiguration.

DHCPv6 servers send reconfigure messages to DHCPv6 clients, initiating a message exchange. In response, DHCPv6 clients that support the reconfigure message transition to the renewing state and send a renew message to the server. The server returns a reply message with a lifetime of zero (0). The client transitions to the init state and sends a solicit message. The server sends an advertise message to indicate that it is available for service. The client sends a request for configuration parameters, which the server then includes in its reply. DHCP relay and DHCP relay proxy do not participate in the client reconfiguration or react to reconfigure messages other than to forward them to the client.

When a DHCPv6 server is triggered to initiate reconfiguration on a bound DHCPv6 client, the client transitions to the reconfigure state. All subscriber services, such as forwarding and statistics, continue to work. The server then sends the reconfigure message to the client. If the DHCPv6 client is already in the reconfigure state, the DHCPv6 server ignores the reconfiguration trigger. For clients in any state other than bound or reconfigure, the server clears the binding state of the client, as if the **clear dhcpv6 server binding** command had been issued.

Dynamic Configuration Options

You can enable dynamic reconfiguration for all DHCP clients or only the DHCP clients serviced by a specified group of interfaces, and you can modify the behavior accordingly.

- To enable dynamic reconfiguration with default reconfiguration values for all DHCP clients, include the **reconfigure** statement at the **[edit system services dhcp-local-server]** hierarchy level for DHCPv4 clients, and at the **[edit system services dhcp-local-server dhcpv6]** hierarchy level for DHCPv6 clients.
- Alternatively, to enable dynamic reconfiguration for only the DHCP clients serviced by a specified group of interfaces, include the **reconfigure** statement at the **[edit system services dhcp-local-server group *group-name*]** hierarchy level for DHCPv4 clients, and at the **[edit system services dhcp-local-server dhcpv6 group *group-name*]** hierarchy level for DHCPv6 clients.

You can optionally modify the behavior of the reconfiguration process by including the appropriate statements at the **[edit system services dhcp-local-server reconfigure]** hierarchy level for all DHCPv4 clients, and at the **[edit system services dhcp-local-server dhcpv6 reconfigure]** hierarchy level for all DHCPv6 clients. To override this global configuration for only the DHCP clients serviced by a specified group of interfaces, you can include the statements with different values at the **[edit system services dhcp-local-server group *group-name* reconfigure]** hierarchy level for DHCPv4 clients, and at the **[edit system services dhcp-local-server dhcpv6 group *group-name* reconfigure]** hierarchy level for DHCPv6 clients.

Include the **attempts** statement to specify how many times the local server sends the forcerenew or reconfigure message to initiate client reconfiguration. Include the **timeout** statement to set the interval between the first and second attempts. The interval between each subsequent attempt doubles the previous value. For example, if the first value is 2, the first retry is attempted 2 seconds after the first attempt fails. The second retry is attempted 4 seconds after the first retry fails. The third retry is attempted 8 seconds after the second retry fails, and so on.

By default, the DHCP client's original configuration is restored if all of the reconfiguration attempts fail. Include the **clear-on-abort** statement to delete the client instead.

You can configure an authentication token by including the **token** statement. The DHCP local server then includes this token inside the authentication option when it sends forcerenew or reconfigure messages. If the service provider has previously configured the DHCP client with this token, then the client can compare that token against the newly received token, and reject the message if the tokens do not match. This functionality corresponds to RFC 3118, *Authentication for DHCP Messages*, section 4.

In the event of a RADIUS-initiated disconnect (RID), the client is deleted by default. You can configure the client to be reconfigured instead of deleted by including the **radius-disconnect** statement. The client is deleted if all attempts to reconfigure the client fail.

For the DHCPv6 server only, you can include the **strict** statement. By default, the server accepts solicit messages from clients that do not support server-initiated reconfiguration. Including this statement causes the server to discard solicit messages from nonsupporting clients; consequently the server does not bind these clients.

You can force the local server to initiate the reconfiguration process for clients by issuing the **request dhcp server reconfigure** command for DHCPv4 clients, and the **request dhcpv6 server reconfigure** command for DHCPv6 clients. Command options determine whether reconfiguration is then attempted for all clients or specified clients.

Events that take place while a reconfiguration is in process take precedence over the reconfiguration. Table 23 on page 116 lists the actions taken in response to several different events.

Table 23: Action Taken for Events That Occur During a Reconfiguration

Event	Action
Server receives a discover (DHCPv4) or solicit (DHCPv6) message from the client.	Server drops packet and deletes client.
Server receives a request, renew, rebind, or init-reboot message from the client.	DHCPv4—Server sends NAK message and deletes client. DHCPv6—Server drops packet and deletes client. Server replies to renew message with lease time of zero (0).
Server receives a release or decline message from the client.	Server deletes client.
The client lease times out.	Server deletes client.
The **clear dhcp server binding** command is issued.	Server deletes client.
The **request dhcp server reconfigure** (DHCPv4) or **request dhcpv6 server reconfigure** (DHCPv6) command is issued.	Command is ignored.

Table 23: Action Taken for Events That Occur During a Reconfiguration *(continued)*

Event	Action
GRES or DHCP restart occurs.	Reconfiguration process is halted.

Related Documentation

- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 117

Configuring Extended DHCP Local Server Dynamic Client Reconfiguration

The DHCP local server can initiate reconfiguration of its clients to avoid extended outages because of server configuration changes. In addition to requesting that the DHCP local server initiate reconfiguration, you can specify the reconfiguration behavior.

To configure dynamic reconfiguration of DHCP clients:

1. Enable dynamic reconfiguration with default values for all clients.

   For DHCPv4:

   ```
   [edit system services dhcp-local-server]
   user@host# set reconfigure
   ```

   For DHCPv6:

   ```
   [edit system services dhcp-local-server dhcpv6]
   user@host# set reconfigure
   ```

2. (Optional) Override the global configuration for a particular group of clients.

   For DHCPv4:

   ```
   [edit system services dhcp-local-server group-name]
   user@host# set reconfigure
   ```

   For DHCPv6:

   ```
   [edit system services dhcp-local-server dhcpv6 group group-name]
   user@host# set reconfigure
   ```

3. (Optional) Configure how the server attempts reconfiguration.

   See “Configuring Dynamic Reconfiguration Attempts for DHCP Clients” on page 118.

4. (Optional) Configure the response to a failed reconfiguration.

   See “Configuring Deletion of the Client When Dynamic Reconfiguration Fails” on page 119.

5. (Optional) Configure the behavior in response to a RADIUS-initiated disconnect.

   See “Configuring Reconfiguration of the Client on Receipt of RADIUS-Initiated Disconnect” on page 119.

6. (Optional) Configure a token for rudimentary server authentication.

   See “Configuring a Token for DHCP Local Server Authentication” on page 120.

7. (Optional) Initiate reconfiguration of some or all client bindings.

   See “Requesting DHCP Local Server to Initiate Reconfiguration of Client Bindings” on page 120.

8. (Optional) Prevent DHCPv6 clients from binding if they do not support reconfigure messages.

   See Preventing Binding of Clients That Do Not Support Reconfigure Messages.

Configuring Dynamic Reconfiguration Attempts for DHCP Clients

You can configure how many attempts the local server makes to initiate reconfiguration of the DHCP client by sending forcerenew messages. You can also specify how long the server waits between attempts. By default, eight attempts are made and the initial interval is two seconds.

(Optional) To configure DHCP local server reconfiguration behavior for all DHCP clients:

1. Specify the number of reconfiguration attempts.

   For DHCPv4:

   ```
   [edit system services dhcp-local-server reconfigure]
   user@host# set attempts 5
   ```

   For DHCPv6:

   ```
   [edit system services dhcp-local-server dhcpv6 reconfigure]
   user@host# set attempts 5
   ```

2. Specify the interval between reconfiguration attempts.

   For DHCPv4:

   ```
   [edit system services dhcp-local-server reconfigure]
   user@host# set timeout 8
   ```

   For DHCPv6:

   ```
   [edit system services dhcp-local-server dhcpv6 reconfigure]
   user@host# set timeout 8
   ```

To override the global configuration for a particular group of clients, include the statements at the **[edit system services dhcp-local-server group *group-name* reconfigure]** hierarchy level or the **[edit system services dhcpv6 dhcp-local-server group *group-name* reconfigure]** hierarchy level.

Related Documentation

- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 117
- **attempts on page 786**
- **timeout on page 1115**

Configuring Deletion of the Client When Dynamic Reconfiguration Fails

You can configure the local server to delete the client when the maximum number of reconfiguration attempts has been made without success. By default, the client's original configuration is restored.

(Optional) To configure the DHCP local server to delete the client when reconfiguration is not successful, for all clients:

- Specify the client deletion.

  For DHCPv4:

  ```
  [edit system services dhcp-local-server reconfigure]
  user@host# set clear-on-abort
  ```

  For DHCPv6:

  ```
  [edit system services dhcp-local-server dhcpv6 reconfigure]
  user@host# set clear-on-abort
  ```

To override the global configuration for a particular group of clients, include the statement at the **[edit system services dhcp-local-server group *group-name* reconfigure]** hierarchy level or the **[edit system services dhcpv6 dhcp-local-server group *group-name* reconfigure]** hierarchy level.

Related Documentation

- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 117
- **clear-on-abort on page 805**

Configuring Reconfiguration of the Client on Receipt of RADIUS-Initiated Disconnect

You can configure the local server to reconfigure the client when the client receives a RADIUS-initiated disconnect. By default, the client is deleted when a RADIUS-initiated disconnect is received.

(Optional) To configure the DHCP local server to reconfigure the client instead of deleting the client when a RADIUS-initiated disconnect is received, for all clients:

- Specify the RADIUS-initiated disconnect trigger.

  For DHCPv4:

  ```
  [edit system services dhcp-local-server reconfigure trigger]
  user@host# set radius-disconnect
  ```

  For DHCPv6:

  ```
  [edit system services dhcp-local-server dhcpv6 reconfigure trigger]
  user@host# set radius-disconnect
  ```

To override the global configuration for a particular group of clients, include the statement at the **[edit system services dhcp-local-server group *group-name* reconfigure trigger]**

hierarchy level or the **[edit system services dhcpv6 dhcp-local-server group *group-name* reconfigure trigger]** hierarchy level.

Related Documentation

- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 117
- **radius-disconnect on page 1050**
- **trigger on page 1146**

Configuring a Token for DHCP Local Server Authentication

You can configure the local server to include a constant, unencoded token in the DHCP forcerenew message as part of the authentication option it sends to clients. The client compares the received token with a token already configured on the client. If the tokens do not match, the DHCP client discards the forcerenew message. Use of the token provides rudimentary protection against inadvertently instantiated DHCP servers.

(Optional) To configure the DHCP local server to include a token in the forcerenew message sent to the client, for all clients:

- Specify the token.

  For DHCPv4:

  ```
  [edit system services dhcp-local-server reconfigure]
  user@host# set token 8ysIU9E32k8r
  ```

  For DHCPv6:

  ```
  [edit system services dhcp-local-server dhcpv6 reconfigure]
  user@host# set token 8ysIU9E32k8r
  ```

To override the global configuration for a particular group of clients, include the statement at the **[edit system services dhcp-local-server group *group-name* reconfigure]** hierarchy level or the **[edit system services dhcpv6 dhcp-local-server group *group-name* reconfigure]** hierarchy level.

Related Documentation

- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 117
- **token on page 1118**

Requesting DHCP Local Server to Initiate Reconfiguration of Client Bindings

You can request that the DHCP local server initiate reconfiguration of all of clients or only specified clients.

To request reconfiguration of all clients:

- Specify the **all** option.

  For DHCPv4:

  ```
  user@host> request dhcp server reconfigure all
  ```

For DHCPv6:

```
user@host> request dhcpv6 server reconfigure all
```

You can use any of the following methods to request reconfiguration of specific clients:

- Specify the IP address of the DHCP client.

  For DHCPv4:

  ```
  user@host> request dhcp server reconfigure 192.168.27.3
  ```

  For DHCPv6:

  ```
  user@host> request dhcpv6 server reconfigure 2001:bd8:1111:2222::
  ```

- Specify the client ID of a DHCPv6 client.

  ```
  user@host> request dhcpv6 server reconfigure
    LL_TIME0x1-0x2e159c0-00:10:94:00:00:02
  ```

- Specify the session ID of a DHCPv6 client.

  ```
  user@host> request dhcpv6 server reconfigure 5
  ```

- Specify the MAC address of a DHCPv4 client.

  ```
  user@host> request dhcp server reconfigure 12:23:34:45:56:67
  ```

- Specify an interface; reconfiguration is attempted for all clients on this interface.

  ```
  user@host> request dhcp server reconfigure interface fe-0/0/0.100
  ```

- Specify a logical system; reconfiguration is attempted for all clients or the specified clients in this logical system.

  ```
  user@host> request dhcp server reconfigure all logical-system ls-bldg5
  ```

- Specify a routing instance; reconfiguration is attempted for all clients or the specified clients in this routing instance.

  ```
  user@host> request dhcp server reconfigure all routing-instance ri-boston
  ```

Related Documentation

- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 117
- request dhcp server reconfigure

Verifying and Managing DHCP Local Server Configuration

Purpose View or clear information about client address bindings and statistics for the extended DHCP local server.

Action

- To display the address bindings in the client table on the extended DHCP local server:

  ```
  user@host> show dhcp server binding
  ```

- To display extended DHCP local server statistics:

  ```
  user@host> show dhcp server statistics
  ```

- To clear the binding state of a DHCP client from the client table on the extended DHCP local server:

  user@host> **clear dhcp server binding**

- To clear all extended DHCP local server statistics:

  user@host> **clear dhcp server statistics**

Related Documentation

- For more information, see the *Junos OS System Basics and Services Command Reference*

Verifying and Managing DHCPv6 Local Server Configuration

Purpose View or clear information about client address bindings and statistics for the DHCPv6 local server.

Action

- To display the address bindings in the client table on the DHCPv6 local server:

  user@host> **show dhcpv6 server binding**

- To display DHCPv6 local server statistics:

  user@host> **show dhcpv6 server statistics**

- To clear all DHCPv6 local server statistics:

  user@host> **clear dhcpv6 server binding**

- To clear all DHCPv6 local server statistics:

  user@host> **clear dhcpv6 server statistics**

Related Documentation

- For more information, see the *Junos OS System Basics and Services Command Reference*

Graceful Routing Engine Switchover

The extended DHCP local server and the DHCP relay agent applications both maintain the state of active DHCP client leases in the session database. The extended DHCP application can recover this state if the DHCP process fails or is manually restarted, thus preventing the loss of active DHCP clients in either of these circumstances. However, the state of active DHCP client leases is lost if a power failure occurs or if the kernel stops operating (for example, when the router is reloaded) on a single Routing Engine.

The extended DHCP local server and the DHCP relay agent support graceful Routing Engine switchover on all routing platforms that contain dual Routing Engines. To support graceful Routing Engine switchover, the extended DHCP application automatically mirrors (replicates) information about the state of bound DHCP clients from the master Routing Engine to the backup Routing Engine.

To enable graceful Routing Engine switchover support for the extended DHCP local server or DHCP relay agent, include the **graceful-switchover** statement at the **[edit chassis redundancy]** hierarchy level. You cannot disable graceful Routing Engine switchover

support for the extended DHCP application when the router is configured to support graceful Routing Engine switchover.

For more information about using graceful Routing Engine switchover, see the *Junos OS High Availability Configuration Guide*.

Related Documentation

- Extended DHCP Local Server Overview on page 84
- Extended DHCP Relay Agent Overview on page 136

Tracing Extended DHCP Operations

Both the extended DHCP local server and the extended DHCP relay agent support tracing operations. DHCP tracing operations track extended DHCP operations and record them in a log file. The error descriptions captured in the log file provide detailed information to help you solve problems.

You can configure DHCP trace operations at the global level or at the interface level. If you configure interface-level trace operations, you can specify tracing for a range of interfaces or an individual interface.

By default, nothing is traced. When you enable the tracing operation, the default tracing behavior is as follows:

- Important events for both global and per-interface tracing are logged in a file called **jdhcpd** located in the **/var/log** directory. You cannot change the directory (**/var/log**) in which trace files are located.
- When the file **jdhcpd** reaches 128 kilobytes (KB), it is renamed **jdhcpd.0**, then **jdhcpd.1**, and so on, until there are three trace files. Then the oldest trace file (**jdhcpd.2**) is overwritten.

  You can optionally configure the maximum file size to be from 10 KB through 1 gigabyte (GB). You can also specify the number of trace files to be from 2 through 1000. (For more information about how log files are created, see the *Junos OS System Log Messages Reference*.)
- Log files can be accessed only by the user who configures the tracing operation.

To specify that you want to configure global DHCP tracing operations.

- For DHCP local server:

  ```
  [edit system services dhcp-local-server]
  user@host# edit traceoptions
  ```

- For DHCP relay:

  ```
  [edit forwarding-options dhcp-relay]
  user@host# edit traceoptions
  ```

For information about configuring per-interface tracing options, see “Tracing Extended DHCP Operations for Specific Interfaces” on page 127.

The extended DHCP traceoptions operations are described in the following sections:

Configuring the Extended DHCP Log Filename

By default, the name of the file that records trace output is **jdhcpd**. You can specify a different name by including the **file** option:

To configure the filename for DHCP local server and DHCP relay agent tracing operations, specify the name of the file used for the trace output. (DHCP local server and DHCP relay agent both support the **file** option for the **traceoptions** statement.)

```
[edit system services dhcp-local-server traceoptions]
user@host# set file filename
```

Configuring the Number and Size of Extended DHCP Log Files

By default, when the trace file reaches 128 kilobytes (KB) in size, it is renamed ***filename*.0**, then ***filename*.1**, and so on, until there are three trace files. Then the oldest trace file (***filename*.2**) is overwritten.

You can optionally configure the maximum file size to be from 10 KB through 1 gigabyte (GB). You can also specify the number of trace files to be from 2 through 1000.

For example, you can set the maximum file size to 2 MB, and the maximum number of files to 20. When the file that receives the output of the tracing operation (***filename***) reaches 2 MB, ***filename*** is renamed ***filename*.0**, and a new file called ***filename*** is created. When the new ***filename*** reaches 2 MB, ***filename*.0** is renamed ***filename*.1** and ***filename*** is renamed ***filename*.0**. This process repeats until there are 20 trace files. Then the oldest file (***filename*.19**) is overwritten by the newest file (***filename*.0**).

To configure the number and size of trace files, specify the name, number, and size of the file used for the trace output. DHCP local server and DHCP relay agent both support the **files** and **size** options for the **traceoptions** statement and the **interface-traceoptions** statement.

```
[edit system services dhcp-local-server traceoptions]
user@host# set file filename files number size size
```

Configuring Access to the Extended DHCP Log File

By default, log files can be accessed only by the user who configures the tracing operation. You can enable all users to read the log file and you can explicitly set the default behavior of the log file.

To specify that all users can read the log file, configure the log file to be world-readable. DHCP local server and DHCP relay agent both support the **world-readable** option for the **traceoptions** statement and the **interface-traceoptions** statement.

```
[edit system services dhcp-local-server traceoptions]
user@host# set file filename world-readable
```

To explicitly set the default behavior, in which the log file can only be read by the user who configured tracing, configure the log file to be no-world-readable. DHCP local server and DHCP relay agent both support the **no-world-readable** option for the **traceoptions** statement and the **interface-traceoptions** statement.

```
[edit system services dhcp-local-server traceoptions]
user@host# set file filename no-world-readable
```

Configuring a Regular Expression for Extended DHCP Lines to Be Logged

By default, the trace operation output includes all lines relevant to the logged events. You can refine the output by including regular expressions that will be matched.

To configure regular expressions to be matched, specify the regular expression. DHCP local server and DHCP relay agent both support the **match** option for the **traceoptions** statement.

```
[edit system services dhcp-local-server traceoptions]
user@host# set file filename match regular-expression
```

Configuring the Extended DHCP Tracing Flags

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. All flags are available for global tracing operations. The Interface-Specific Tracing column shows the subset of flags that you can use for per-interface tracing.

Flag	Description	Interface-Specific Tracing
all	Trace all events	No
auth	Trace authentication events	No
database	Trace database events	No
dhcpv6-general	Trace miscellaneous DHCPv6 events	No
dhcpv6-io	Trace I/O operations for DHCPv6	No

Flag	Description	Interface-Specific Tracing
dhcpv6-packet	Trace DHCPv6 packet decoding operations	Yes
dhcpv6-packet-option	Trace DHCPv6 option decoding operations	Yes
dhcpv6-rpd	Trace routing protocol process events for DHCPv6	No
dhcpv6-session-db	Trace session database operations for DHCPv6	No
dhcpv6-state	Trace changes in state for DHCPv6 operations	Yes
fwd	Trace firewall process events	No
general	Trace miscellaneous events	No
ha	Trace high availability-related events	No
interface	Trace interface operations	No
io	Trace I/O operations	No
packet	Trace packet decoding operations	Yes
packet-option	Trace DHCP option decoding operations	Yes
performance	Trace performance measurement operations	No
profile	Trace profile operations	No
rpd	Trace routing protocol process events	No
rtsock	Trace routing socket operations	No
session-db	Trace session database events	No
state	Trace changes in state	Yes
statistics	Trace baseline statistics	No
ui	Trace user interface operations	No

To configure the flags for the events to be logged, specify the flags. DHCP local server and DHCP relay agent both support the **flag** option for the **traceoptions** statement and the **interface-traceoptions** statement.

- For global tracing operations

  ```
  [edit system services dhcp-local-server traceoptions]
  user@host# set flag flag
  ```

- For per-interface tracing operations

  ```
  [edit system services dhcp-local-server interface-traceoptions]
  user@host# set flag flag
  ```

  For additional information on configuring per-interface tracing options, see "Tracing Extended DHCP Operations for Specific Interfaces" on page 127.

Tracing Extended DHCP Operations for Specific Interfaces

In addition to the global DHCP tracing operations, subscriber management enables you to trace extended DHCP operations for a specific interface or for a range of interfaces.

Configuring per-interface tracing is a two-step procedure. In the first step, you specify the tracing options that you want to use, such as file information and flags. In the second step, you enable the tracing operation on the specific interfaces.

To configure per-interface tracing operations:

1. Specify the tracing options you want to use.

   NOTE: Per-interface tracing uses the same default tracing behavior as the global extended DHCP tracing operation. The default behavior is described in "Tracing Extended DHCP Operations" on page 123.

   a. Specify that you want to configure per-interface tracing options.

      - For DHCP local server and DHCPv6 local server:

        ```
        [edit system services dhcp-local-server]
        user@host# edit interface-traceoptions
        ```

      - For DHCP relay agent:

        ```
        [edit forwarding-options dhcp-relay]
        user@host# edit interface-traceoptions
        ```

   b. (Optional) Specify the tracing file options.

      - Configure the name for the file used for the trace output.

        See "Configuring the Extended DHCP Log Filename" on page 124.

      - Configure the number and size of the log files.

        See "Configuring the Number and Size of Extended DHCP Log Files" on page 124.

      - Configure access to the log file.

See “Configuring Access to the Extended DHCP Log File” on page 125.

- Configure a regular expression to filter logging events.

  See “Configuring a Regular Expression for Extended DHCP Lines to Be Logged” on page 125.

c. (Optional) Specify tracing flag options.

   See “Configuring the Extended DHCP Tracing Flags” on page 125.

2. Enable tracing on an interface or interface range.

   The following examples show a DHCP local server configuration. You can also use the **trace** statement at the **[edit forwarding-options dhcp-relay]** hierarchy level and at the **[edit system services dhcp-local-server dhcpv6]** hierarchy level.

   - Enable tracing on a specific interface.

     ```
     [edit system services dhcp-local-server]
     user@host# set group group-name interface interface-name trace
     ```

   - Enable tracing on a range of interfaces.

     ```
     [edit system services dhcp-local-server]
     user@host# set group group-name interface interface-name upto interface
       interface-name trace
     ```

CHAPTER 8

DHCP Local Server Examples

Example: Minimum Extended DHCP Local Server Configuration

This example shows the minimum configuration you need to use for the extended DHCP local server on the router:

```
[edit system services]
dhcp-local-server {
    group group_one {
        interface fe-0/0/2.0;
    }
}
```

This example creates the server group named **group_one**, and specifies that the DHCP local server is enabled on interface **fe-0/0/2.0** within the group. The DHCP local server uses the default pool match configuration of **ip-address-first.**

Related Documentation

- Extended DHCP Local Server Overview on page 84

Example: Extended DHCP Local Server Configuration with Optional Pool Matching

This example shows an extended DHCP local server configuration that includes optional IPv4 address-assignment pool matching and interface groups. For pool matching, this configuration specifies that the DHCP local server first check the response from an external authentication authority (for example, RADIUS) and use the Framed-IPv6-Pool attribute to determine the address-assignment pool to use for the client address. If no external authority match is found, the DHCP local server then uses ip-address-first matching together with the option 82 information to match the named address range for client IPv4 address assignment. The option 82 matching must also be included in the address-assignment pool configuration.

```
[edit system services]
dhcp-local-server {
```

```
    group group_one {
      interface fe-0/0/2.0;
      interface fe-0/0/2.1;
    }
    group group_two {
      interface fe-0/0/3.0;
      interface fe-0/0/3.1;
    }
    pool-match-order {
      external-authority
      ip-address-first;
      option-82;
    }
}
```

Related Documentation

- Extended DHCP Local Server Overview on page 84
- Address-Assignment Pools Overview on page 55

Example: Extended DHCPv6 Local Server Configuration

This example shows a sample extended DHCPv6 local server configuration. The second part of the example shows a sample RADIUS authentication configuration—authentication must be configured for DHCPv6 local server operations.

```
[edit system services]
dhcp-local-server {
  dhcpv6 {
    authentication {
      password v679M8vt;
      username-include {
        user-prefix wallybrown;
        domain-name isp55.com;
      }
    }
    group group_two {
      authentication {
        password P$55qw4$$;
        username-include {
          user-prefix south5;
          domain-name isp55.com;
        }
      }
      interface ge-1/0/3.0;
    }
  }
}
```

The following is a sample RADIUS authentication configuration.

```
[edit access]
radius-server {
  192.168.1.250 {
    port 1812;
    secret &tIUEI*7688+;
```

```
    }
  }
  profile isp-bos-metro-fiber-basic {
    accounting-order radius;
    authentication-order radius;
    radius {
      authentication-server 192.168.1.250;
      accounting-server 192.168.1.250;
    }
    accounting {
      order radius;
      accounting-stop-on-failure;
      accounting-stop-on-access-deny;
      update-interval 10;
      statistics time;
    }
  }
```

Related Documentation

- DHCPv6 Local Server Overview on page 88

PART 4

DHCP Relay Agent for Subscriber Access

CHAPTER 9

DHCP Relay Agent Overview

Extended DHCP Relay Agent Overview

You can configure extended DHCP relay options on the router and enable the router to function as a DHCP relay agent. A DHCP relay agent forwards DHCP request and reply packets between a DHCP client and a DHCP server. You can use DHCP relay in carrier edge applications such as video/IPTV to obtain configuration parameters, including an IP address, for your subscribers.

For more information about how to use the DHCP relay agent in a video/IPTV application, see the *Junos OS Feature Guide*.

NOTE: The extended DHCP relay agent options configured with the **dhcp-relay** statement are incompatible with the DHCP/BOOTP relay agent options configured with the **bootp** statement. As a result, you cannot enable both the extended DHCP relay agent and the DHCP/BOOTP relay agent on the router at the same time.

For information about the DHCP/BOOTP relay agent, see the *Junos OS Policy Framework Configuration Guide*.

To configure the extended DHCP relay agent on the router, include the **dhcp-relay** statement at the **[edit forwarding-options]** hierarchy level. See the "[edit forwarding-options dhcp-relay] Hierarchy Level" on page 746 for the complete DHCP relay agent syntax.

You can also include the **dhcp-relay** statement at the following hierarchy levels:

- **[edit logical-systems *logical-system-name* forwarding-options]**
- **[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options]**
- **[edit routing-instances *routing-instance-name* forwarding-options]**

This overview covers:

Interaction Among the DHCP Relay Agent, DHCP Client, and DHCP Servers

In a typical carrier edge network configuration, the DHCP client is on the subscriber's computer, and the DHCP relay agent is configured on the router between the DHCP client and one or more DHCP servers.

The following steps describe, at a high level, how the DHCP client, DHCP relay agent, and DHCP server interact in a configuration that includes two DHCP servers.

1. The DHCP client sends a discover packet to find a DHCP server in the network from which to obtain configuration parameters for the subscriber, including an IP address.
2. The DHCP relay agent receives the discover packet and forwards copies to each of the two DHCP servers. The DHCP relay agent then creates an entry in its internal client table to keep track of the client's state.
3. In response to receiving the discover packet, each DHCP server sends an offer packet to the client. The DHCP relay agent receives the offer packets and forwards them to the DHCP client.
4. On receipt of the offer packets, the DHCP client selects the DHCP server from which to obtain configuration information. Typically, the client selects the server that offers the longest lease time on the IP address.
5. The DHCP client sends a request packet that specifies the DHCP server from which to obtain configuration information.
6. The DHCP relay agent receives the request packet and forwards copies to each of the two DHCP servers.
7. The DHCP server requested by the client sends an acknowledgement (ACK) packet that contains the client's configuration parameters.
8. The DHCP relay agent receives the ACK packet and forwards it to the client.
9. The DHCP client receives the ACK packet and stores the configuration information.
10. If configured to do so, the DHCP relay agent installs a host route and Address Resolution Protocol (ARP) entry for this client.
11. After establishing the initial lease on the IP address, the DHCP client and the DHCP server use unicast transmission to negotiate lease renewal or release. The DHCP relay agent "snoops" on all of the packets unicast between the client and the server that pass through the router to determine when the lease for this client has expired or been released. This process is referred to as lease shadowing or passive snooping.

Related Documentation

- Access and Access-Internal Routes for Subscriber Management on page 185
- Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 89
- Using External AAA Authentication Services with DHCP on page 96
- DHCP Relay Proxy Overview on page 138
- Graceful Routing Engine Switchover on page 122
- Verifying and Managing DHCP Relay Configuration on page 178
- Tracing Extended DHCP Operations on page 123
- Example: Minimum DHCP Relay Agent Configuration on page 189
- Example: DHCP Relay Agent Configuration with Multiple Clients and Servers on page 189
- Example: Using Option 60 Strings to Forward DHCP Client Traffic on page 193

- Example: Using Option 60 Strings to Drop DHCP Client Traffic on page 194

DHCP Relay Proxy Overview

DHCP relay proxy mode is an enhancement to extended DHCP relay. DHCP relay proxy supports all DHCP relay features while providing additional features and benefits.

Normally, extended DHCP relay operates as a helper application for DHCP operations. Except for the ability to add DHCP relay agent options and the gateway address (giaddr) to DHCP packets, DHCP relay is transparent to DHCP clients and DHCP servers, and simply forwards messages between DHCP clients and servers.

When you configure DHCP relay to operate in proxy mode, the relay is no longer transparent. In proxy mode, DHCP relay conceals DHCP server details from DHCP clients, which interact with a DHCP relay in proxy mode as though it is the DHCP server. For DHCP servers there is no change, because proxy mode has no effect on how the DHCP server interacts with the DHCP relay.

DHCP relay proxy provides the following benefits:

- DHCP server isolation and DoS protection—DHCP clients are unable to see the DHCP servers, learn DHCP server addresses, or determine the number of servers that are proving DHCP support. Server isolation also provides denial-of-service (DoS) protection for the DHCP servers.
- Multiple lease offer selection—DHCP relay proxy receives lease offers from multiple DHCP servers and selects a single offer to send to the DHCP client, thereby reducing traffic in the network. Currently, the DHCP relay proxy selects the first offer received.
- Support for both numbered and unnumbered Ethernet interfaces—For DHCP clients connected through Ethernet interfaces, when the DHCP client obtains an address, the DHCP relay proxy adds an access internal host route specifying that interface as the outbound interface. The route is automatically removed when the lease time expires or when the client releases the address.
- Logical system support—DHCP relay proxy can be configured in a logical system, whereas a non-proxy mode DHCP relay cannot.

NOTE: Extended DHCP relay proxy is not supported for the J Series Services Routers DHCP server. Also, you cannot configure both DHCP relay proxy and extended DHCP local server on the same interface.

Interaction Among DHCP Relay Proxy, DHCP Client, and DHCP Servers

The DHCP relay agent is configured on the router, which operates between the DHCP client and one or more DHCP servers.

The following steps provide a high level description of how DHCP relay proxy interacts with DHCP clients and DHCP servers.

1. The DHCP client sends a discover packet to locate a DHCP server in the network from which to obtain configuration parameters for the subscriber.
2. The DHCP relay proxy receives the discover packet from the DHCP client and forwards copies of the packet to each supporting DHCP server. The DHCP relay proxy then creates a client table entry to keep track of the client state.
3. In response to the discover packet, each DHCP server sends an offer packet to the client, which the DHCP relay proxy receives. The DHCP relay proxy does the following:
   a. Selects the first offer received as the offer to sent to the client
   b. Replaces the DHCP server address with the address of the DHCP relay proxy
   c. Forwards the offer to the DHCP client.
4. The DHCP client receives the offer from the DHCP relay proxy.
5. The DHCP client sends a request packet that indicates the DHCP server from which to obtain configuration information—the request packet specifies the address of the DHCP relay proxy.
6. The DHCP relay proxy receives the request packet and forwards copies, which include the address of selected server, to all supporting DHCP servers.
7. The DHCP server requested by the client sends an acknowledgement (ACK) packet that contains the client configuration parameters.
8. The DHCP relay proxy receives the ACK packet, replaces the DHCP server address with its own address, and forwards the packet to the client.
9. The DHCP client receives the ACK packet and stores the configuration information.
10. If configured to do so, the DHCP relay proxy installs a host route and Address Resolution Protocol (ARP) entry for the DHCP client.
11. After the initial DHCP lease is established, the DHCP relay proxy receives all lease renewals and lease releases from the DHCP client and forwards them to the DHCP server.

Related Documentation

- Extended DHCP Relay Agent Overview on page 136
- Enabling DHCP Relay Proxy Mode on page 176

Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview

The router's DHCP support enables you to attach a dynamic profile to a DHCP subscriber interface. When a DHCP subscriber logs in, the router instantiates the specified dynamic profile and then applies the services defined in the profile to the interface.

You can attach dynamic profiles to all interfaces or you can specify a particular group of interfaces to which the profile is attached. Both the DHCP local server and the DHCP relay agent support the attachment of dynamic profiles to interfaces.

You can enable the following optional features when the dynamic profile is a attached. The two options cannot be used together.

- Enable multiple DHCP subscribers to share the same VLAN logical interface. The firewall filters, CoS schedulers, and IGMP configuration of the clients are merged.
- Specify the primary dynamic profile that is instantiated when the first subscriber logs in.

Multiple DHCP Subscribers Sharing the Same VLAN Logical Interface

The **aggregate-clients** statement specifies that the router merge the firewall filters, CoS schedulers, and IGMP configuration of multiple DHCP clients that are on the same VLAN logical interface (for example, multiple clients belonging to the same household). You can configure the aggregate-clients support for all interfaces or for a group of interfaces. The **aggregate-clients** statement provides the option of either merging (chaining) or replacing software components for each client.

By default, the feature is disabled and a single DHCP client is allowed per VLAN when a dynamic profile is associated with the VLAN logical interface.

When you specify the **merge** option, the router aggregates the software components for multiple subscribers as follows:

- Firewall filters—The filters are chained together using the precedence as the order of execution. If the same firewall filter is attached multiple times, the filter is executed only once.
- CoS schedulers—The different CoS schedulers are merged as if the scheduler map has multiple schedulers. The merge operation for the individual traffic-control-profiles parameters (shaping-rate, delay-buffer-rate, guaranteed-rate) preserves the maximum value for each parameter.
- IGMP configuration—The current IGMP configuration is replaced with the configuration of the newest DHCP client.

When you specify the **replace** option, the entire logical interface is replaced whenever a new client logs into the network using the same VLAN logical interface. For example, if a customer subscribes to voice, video, and data services on the network, when a voice client logs in, instead of applying a specific voice filter for only that service, the entire voice, video, and data filter chain is applied.

NOTE: You cannot use a dynamic demux interface to represent multiple subscribers in a dynamic profile attached to an interface. One dynamic demux interface represents one subscriber. Do not configure the **aggregate-clients** option when attaching a dynamic profile to a demux interface for DHCP.

Primary Dynamic Profile

The **use-primary** option enables you to specify the primary dynamic profile that is instantiated when the first subscriber logs in. Subsequent subscribers are not assigned the primary dynamic profile; instead, they are assigned the dynamic profile specified for the interface. When the first subscriber logs out, the next subscriber that logs in is assigned the primary dynamic profile.

This feature can conserve logical interfaces in a network where dynamic IP demux interfaces are used to represent subscribers. To conserve interfaces, the primary profile that you specify should not be a profile that creates a demux interface but one that provides the initial policies for the primary interface subscriber.

Related Documentation

- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109

CHAPTER 10

Configuring DHCP Relay Agent

DHCP Duplicate Client Differentiation Using Client Subinterface Overview

In some network environments, client IDs and MAC addresses might not be unique, resulting in duplicate clients. For example, two network adapters might be manufactured with the same hardware address, resulting in a duplicate MAC address among the DHCP clients attached to the router. A duplicate DHCP client occurs when a client attempts to get a lease, and that client has the same client ID or the same MAC address as an existing DHCP client.

When DHCP server receives a request from a new client that has a duplicate ID or MAC address, DHCP server terminates the address lease for the existing client and returns the address to its original address pool. DHCP server then assigns a new address and lease to the new client.

By default, both DHCP local server and DHCP relay use the subnet information to differentiate between duplicate clients. However, in some cases, this level of differentiation is not adequate. For example, when multiple subinterfaces share the same underlying loopback interface with the same preferred source address, the interfaces appear to be on the same subnet. In this situation, the default configuration prevents duplicate clients.

You can provide greater differentiation between duplicate clients by configuring DHCP to consider the client subinterface when duplicate clients occur. In this optional configuration, DHCP uniquely identifies:

- The subnet on which the client resides
- The subinterface on which the client resides
- The client within the subnet

Related Documentation

- Configuring DHCP Duplicate Client Support on page 95
- Guidelines for Configuring Support for DHCP Duplicate Clients on page 94

Guidelines for Configuring Support for DHCP Duplicate Clients

This topic describes the guidelines for configuring DHCP to include the client subinterface in order to distinguish between duplicate clients (clients with the same MAC address or client ID) in a subscriber access environment.

When configuring DHCP duplicate client support, consider the following guidelines:

- The optional DHCP duplicate client support feature is used for DHCPv4 clients. For DHCPv6, client identification is independent of MAC address.
- For DHCP relay agent configuration:
  - DHCP relay must be configured to insert option 82, regardless of whether or not the incoming packet has option 82.
  - Option 82 must include the Agent Circuit ID suboption (suboption 1).
  - Option 82 must be the interface name, not the interface description.
  - DHCP server must echo option 82 in the server's reply. This is required because of the following:
    - The giaddr inserted by DHCP relay is the same for duplicate clients on different subinterfaces. The DHCP local server uses option 82 when allocating the IP address.
    - DHCP relay uses the echoed option 82 to learn the client subinterface and to construct the client key.
- For the Layer 3 wholesale model:
  - The wholesaler and retailer logical system/routing instances must have the same **duplicate-clients-on-interface** statement configuration.
  - For DHCP relay, the wholesaler and the retailer routing contexts must both be configured with the Agent Circuit ID suboption (suboption 1) in option 82.

Related Documentation

- DHCP Duplicate Client Differentiation Using Client Subinterface Overview on page 94
- Configuring DHCP Duplicate Client Support on page 95

Configuring DHCP Duplicate Client Support

You can optionally configure DHCP local server and DHCP relay to include a client subinterface when distinguishing between two clients that have the same MAC address or client ID. The configuration is a global setting for each logical system/routing instance.

To configure DHCP local server to include the client subinterface:

1. Specify that you want to configure DHCP local server.

   ```
   [edit system services]
   user@host# edit dhcp-local-server
   ```

2. Configure the optional duplicate client support.

   ```
   [edit system services dhcp-local-server]
   user@host# set duplicate-clients-on-interface
   ```

To configure DHCP relay agent to include the client subinterface:

1. Specify that you want to configure DHCP relay agent.

   ```
   [edit forwarding-options]
   user@host# edit dhcp-relay
   ```

2. Configure the optional duplicate client support.

   ```
   [edit system services dhcp-relay]
   user@host# set duplicate-clients-on-interface
   ```

Related Documentation

- DHCP Duplicate Client Differentiation Using Client Subinterface Overview on page 94
- Guidelines for Configuring Support for DHCP Duplicate Clients on page 94

Using External AAA Authentication Services with DHCP

The extended DHCP local server, including DHCPv6 local server, and the extended DHCP relay agent support the use of external AAA authentication services, such as RADIUS, to authenticate DHCP clients. When the extended DHCP local server or relay agent receives a discover PDU from a client, the extended DHCP application contacts the AAA server to authenticate the DHCP client. The extended DHCP application can obtain client addresses and DHCP configuration options from the external AAA authentication server.

NOTE: This section uses the term *extended DHCP application* to refer to both the extended DHCP local server and the extended DHCP relay agent.

The external authentication feature also supports AAA directed logout. If the external AAA service supports a user logout directive, the extended DHCP application honors the logout and responds as though it were requested by a CLI management command. All of the client state information and allocated resources are deleted at logout. The extended DHCP application supports directed logout using the list of configured authentication servers you specify with the **authentication-server** statement at the **[edit access profile *profile-name*]** hierarchy level.

You can configure either global authentication support or group-specific support.

You must configure the **username-include** statement to enable the use of authentication. The **password** statement is not required and does not cause DHCP to use authentication if the **username-include** statement is not included.

To configure DHCP local server and DHCP relay agent authentication support:

1. Specify that you want to configure authentication options.
   - For DHCP local server:

```
[edit system services dhcp-local-server]
user@host# edit authentication
```

- For DHCP relay agent:

```
[edit forwarding-options dhcp-relay]
user@host# edit authentication
```

- For DHCPv6 local server:

```
[edit system services dhcp-local-server dhcpv6]
user@host# edit authentication
```

2. (Optional) Configure a password that authenticates the username to the external authentication service.

   See “Configuring Passwords for Usernames” on page 110.

3. (Optional) Configure optional features to create a unique username.

   See “Creating Unique Usernames for DHCP Clients” on page 111.

Related Documentation

- Extended DHCP Local Server Overview on page 84
- Extended DHCP Relay Agent Overview on page 136
- DHCPv6 Local Server Overview on page 88

Grouping Interfaces with Common DHCP Configurations

You use the group feature to group together a set of interfaces and then apply a common DHCP configuration to the named interface group. The extended DHCP local server, including the DHCPv6 local server, and DHCP relay agent both support interface groups.

To configure an interface group:

1. Access the **[edit system services dhcp-local-server]** hierarchy (for DHCP local server) or the **[edit forwarding-options dhcp-relay]** hierarchy (for DHCP relay agent), depending on the extended DHCP access method you want to configure. The following steps create a DHCP local server group; the steps are the same for the DHCPv6 local server, and DHCP relay agent.
2. Create the group and assign a name.

   ```
   [edit system services dhcp-local-server]
   user@host# edit group boston
   ```

3. Specify the names of one or more interfaces on which the extended DHCP application is enabled. You can repeat the **interface** ***interface-name*** statement to specify multiple interfaces within the group, but you cannot use the same interface in more than one group.

   ```
   [edit system services dhcp-local-server group boston]
   user@host# set interface fe-1/0/1.1
   user@host# set interface fe-1/0/1.2
   ```

4. (Optional) You can use the ***upto*** option to specify a range of interfaces for a group.

```
[edit system services dhcp-local-server group boston]
user@host# set interface fe-1/0/1.3 upto fe-1/0/1.9
```

5. (Optional) You can use the **exclude** option to exclude a specific interface or a specified range of interfaces from the group. For example:

```
[edit system services dhcp-local-server group boston]
user@host# interface fe-1/0/1.1 upto fe-1/0/1.102
user@host# interface fe-1/0/1.6 exclude
user@host# interface fe-1/0/1.70 upto fe-1/0/1.80 exclude
```

Related Documentation

- Extended DHCP Local Server Overview on page 84
- Extended DHCP Relay Agent Overview on page 136
- DHCPv6 Local Server Overview on page 88
- Group-Specific DHCP Local Server Options on page 100
- Group-Specific DHCP Relay Options on page 149
- Guidelines for Configuring Interface Ranges on page 99

Guidelines for Configuring Interface Ranges

This topic describes guidelines that you should consider when configuring interface ranges for named interface groups for DHCP local server and DHCP relay. The guidelines refer to the following configuration statement:

user@host# set interface *interface-name* upto *upto-interface-name*

- The start subunit, **interface** ***interface-name*** , serves as the key for the stanza. The remaining configuration settings are considered attributes.
- If the subunit is not included, an implicit **.0** subunit is enforced. The implicit subunit is applied to all interfaces when autoconfiguration is enabled. For example, **interface ge-2/2/2** is treated as **interface ge-2/2/2.0**.
- Ranged entries contain the **upto** keyword, and the configuration applies to all interfaces within the specified range. The start of a ranged entry must be less than the end of the range. Discrete entries apply to a single interface, except in the case of autoconfiguration, in which a **0** (zero) subunit acts as a wildcard.
- Interface stanzas defined within the same router context are dependent and can constrain each other—both DHCP local server and DHCP relay are considered. Interface stanzas defined across different router contexts are independent and do not constrain one another.
- Each interface stanza, whether discrete or ranged, has a unique start subunit across a given router context. For example, the following configuration is not allowed within the same group because **ge-1/0/0.10** is the start subunit for both.

```
interface ge-1/0/0.10 upto ge-1/0/0.30
interface ge-1/0/0.10
```

- Two groups cannot share interface space. For example, the following configuration is not allowed because the three stanzas share the same space and interfere with one another—interface **ge-1/0/0.26** is a common to all three.

  ```
  dhcp-relay group diamond interface ge-1/0/0.10 upto ge-1/0/0.30
  dhcp-local-server group ruby interface ge-1/0/0.26
  dhcp-relay group sapphire interface ge-1/0/0.25 upto ge-1/0/0.35
  ```

- Two ranges cannot overlap, either within a group or across groups. Overlapping occurs when two interface ranges share common subunit space but neither range is a proper subset of the other. The following ranges overlap:

  ```
  interface ge-1/0/0.10 upto ge-1/0/0.30
  interface ge-1/0/0.20 upto ge-1/0/0.40
  ```

- A range can contain multiple nested ranges. Nested ranges are ranges in which one range is a proper subset of another range. When ranges are nested, the smallest matching range applies.

  In the following example, the three ranges nest properly:

  ```
  interface ge-1/0/0.10 upto ge-1/0/0.30
  interface ge-1/0/0.12 upto ge-1/0/0.15 exclude
  interface ge-1/0/0.25 upto ge-1/0/0.29 exclude
  ```

- Discrete interfaces take precedence over ranges. In the following example, interface **ge-1/0/0.20** takes precedence and enforces an interface client limit of **5**.

  ```
  interface ge-1/0/0.10 upto ge-1/0/0.30
  interface ge-1/0/0.15 upto ge-1/0/0.25 exclude
  interface ge-1/0/0.20 overrides interface-client-limit 5
  ```

Related Documentation

- Grouping Interfaces with Common DHCP Configurations on page 98

Group-Specific DHCP Relay Options

You can include the following statements at both the **[edit forwarding-options dhcp-relay group *group-name*]** hierarchy level to set group-specific DHCP relay agent configuration options, and at the **[edit forwarding-options dhcp-relay]** hierarchy level to set global DHCP relay agent configuration options:

- **active-server-group**—Configure an active server group to apply a common DHCP relay agent configuration to a named group of DHCP server addresses. For information, see "Configuring Active Server Groups" on page 176.
- **authentication**—Configure the parameters the router sends to the external AAA server.
- **dynamic-profile**—Specify the dynamic profile that is attached to a group of interfaces.
- **interface**—Specify one or more interfaces, or a range of interfaces, that are within the specified group.
- **overrides**—Override the default configuration settings for the extended DHCP relay agent. For information, see "Overriding the Default DHCP Relay Configuration Settings" on page 150.

- **relay-option-60**—Use the DHCP vendor class identifier option (option 60) in DHCP client packets to select a DHCP server to which to forward packets. For more information, see "Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers" on page 169.
- **relay-option-82**—Enable or disable the insertion of option 82 information in packets destined for a DHCP server. For information, see "Enabling and Disabling Insertion of Option 82 Information" on page 172.

The statements configured at the **[edit forwarding-options dhcp-relay group *group-name*]** hierarchy level apply only to the named group of interfaces, and override any global DHCP relay agent settings configured with the same statements at the **[edit forwarding-options dhcp-relay]** hierarchy level.

Related Documentation

- Grouping Interfaces with Common DHCP Configurations on page 98

Overriding the Default DHCP Relay Configuration Settings

Subscriber management enables you to override certain default DHCP relay agent configuration settings. You can override the settings at the global level, for a named group of interfaces, or for a specific interface within a named group.

- To override global default DHCP relay agent configuration options, include the **overrides** statement and its subordinate statements at the **[edit forwarding-options dhcp-relay]** hierarchy level.
- To override DHCP relay configuration options for a named group of interfaces, include the statements at the **[edit forwarding-options dhcp-relay group *group-name*]** hierarchy level.
- To override DHCP relay configuration options for a specific interface within a named group of interfaces, include the statements at the **[edit forwarding-options dhcp-relay group *group-name* interface]** hierarchy level.

To override default DHCP relay agent configuration settings:

1. Specify that you want to configure override options.

   Global override:

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit overrides
   ```

   Group-level override:

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit group boston overrides
   ```

   Per-interface override:

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit group boston overrides interface fe-1/0/1.2
   ```

2. (Optional) Enable DHCP relay proxy mode.

See “Enabling DHCP Relay Proxy Mode” on page 176.

3. (Optional) Overwrite the giaddr in DHCP packets that the DHCP relay agent forwards.

   See “Overwriting giaddr Information” on page 152.

4. (Optional) Replace the IP source address in DHCP relay request and release packets with the gateway IP address (giaddr).

   See “Replacing the DHCP Relay Request and Release Packet Source Address” on page 152.

5. (Optional) Override the DHCP relay agent information option (option 82) in DHCP packets.

   See “Overriding Option 82 Information” on page 152.

6. (Optional) Override the setting of the broadcast bit in DHCP request packets and use the Layer 2 unicast transmission method.

   See “Using Layer 2 Unicast Transmission for DHCP Packets” on page 153.

7. (Optional) Trust DHCP client packets that have a giaddr of 0 and that contain option 82 information.

   See “Trusting Option 82 Information” on page 154.

8. (Optional) Override the ARP table population in distrusted environments.

   See “Disabling ARP Table Population” on page 103.

9. (Optional) Override the maximum number of DHCP clients allowed per interface.

   See “Specifying the Maximum Number of DHCP Clients Per Interface” on page 102.

10. (Optional) Configure client auto logout.

    See “DHCP Auto Logout Overview” on page 105.

11. Enable or disable support for DHCP snooped clients on interfaces.

    See “Enabling and Disabling DHCP Snooped Packets Support for DHCP Relay Agent” on page 158.

12. (Optional) Send release messages to the DHCP server when clients are deleted.

    See “Sending Release Messages When Clients Are Deleted” on page 166.

13. (Optional) Disable the DHCP relay agent on specific interfaces.

    See “Disabling DHCP Relay” on page 167.

14. (Optional) Disable automatic binding of stray DHCP requests.

    See “Disabling Automatic Binding of Stray DHCP Requests” on page 167.

Related Documentation

- Group-Specific DHCP Relay Options on page 149
- Deleting DHCP Local Server and DHCP Relay Override Settings on page 108

Overwriting giaddr Information

You can configure the DHCP relay agent to change the gateway IP address (giaddr) field in packets that it forwards between a DHCP client and a DHCP server.

To overwrite the giaddr of every DHCP packet with the giaddr of the DHCP relay agent before forwarding the packet to the DHCP server:

1. Specify that you want to configure override options.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit overrides
   ```

2. Specify that the giaddr of DHCP packets is overwritten.

   ```
   [edit forwarding-options dhcp-relay overrides]
   user@host# set always-write-giaddr
   ```

Related Documentation

- Extended DHCP Relay Agent Overview on page 136
- Overriding the Default DHCP Relay Configuration Settings on page 150

Replacing the DHCP Relay Request and Release Packet Source Address

You can configure the DHCP relay agent to replace request and release packets with the gateway IP address (giaddr) before forwarding the packet to the DHCP server.

To replace the source address with giaddr:

1. Specify that you want to configure override options.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit overrides
   ```

2. Specify that you want to replace the IP source address in DHCP relay request and release packets with the gateway IP address (giaddr).

   ```
   [edit forwarding-options dhcp-relay overrides]
   user@host# set replace-ip-source-with giaddr
   ```

Related Documentation

- Extended DHCP Relay Agent Overview on page 136
- Overriding the Default DHCP Relay Configuration Settings on page 150

Overriding Option 82 Information

You can configure the DHCP relay agent to add or remove the DHCP relay agent information option (option 82) in DHCP packets.

This feature causes the DHCP relay agent to perform one of the following actions, depending on the configuration:

- If the DHCP relay agent is configured to add option 82 information to DHCP packets, it clears the existing option 82 values from the DHCP packets and inserts the new values before forwarding the packets to the DHCP server.
- If the DHCP relay agent is not configured to add option 82 information to DHCP packets, it clears the existing option 82 values from the packets, but does not add any new values before forwarding the packets to the DHCP server.

To override the default option 82 information in DHCP packets destined for a DHCP server:

1. Specify that you want to configure override options.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit overrides
   ```

2. Specify that the option 82 information in DHCP packets is overwritten.

   ```
   [edit forwarding-options dhcp-relay overrides]
   user@host# set always-write-option-82
   ```

Related Documentation

- Extended DHCP Relay Agent Overview on page 136
- Overriding the Default DHCP Relay Configuration Settings on page 150

Using Layer 2 Unicast Transmission for DHCP Packets

You can configure the DHCP relay agent to override the setting of the broadcast bit in DHCP request packets. DHCP relay agent then instead uses the Layer 2 unicast transmission method to send DHCP Offer reply packets and DHCP ACK reply packets from the DHCP server to DHCP clients during the discovery process.

To override the default setting of the broadcast bit in DHCP request packets:

1. Specify that you want to configure override options.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit overrides
   ```

2. Specify that the DHCP relay agent uses the Layer 2 unicast transmission method.

   ```
   [edit forwarding-options dhcp-relay overrides]
   user@host# set layer2-unicast-replies
   ```

Related Documentation

- Extended DHCP Relay Agent Overview on page 136
- Overriding the Default DHCP Relay Configuration Settings on page 150

Trusting Option 82 Information

By default, the DHCP relay agent treats client packets with a giaddr of 0 (zero) and option 82 information as if the packets originated at an untrusted source, and drops them without further processing. You can override this behavior and specify that the DHCP relay agent process DHCP client packets that have a giaddr of 0 (zero) and contain option 82 information.

To configure DHCP relay agent to trust option 82 information:

1. Specify that you want to configure override options.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit overrides
   ```

2. Specify that the DHCP relay agent process DHCP client packets with a giaddr of 0 and that contain option 82 information.

   ```
   [edit forwarding-options dhcp-relay overrides]
   user@host# set trust-option-82
   ```

Related Documentation

- Extended DHCP Relay Agent Overview on page 136
- Overriding the Default DHCP Relay Configuration Settings on page 150

Disabling ARP Table Population

By default, DHCP populates the ARP table with the MAC address of a client when the client binding is established. However, you may choose to use the DHCP **no-arp** statement to hide the subscriber MAC address information, as it appears in ARP table entries.

When running in a trusted environment (that is, when not using the **no-arp** statement), DHCP populates the ARP table with unique MAC addresses contained within the DHCP PDU for each DHCP client:

Table 24: ARP Table in Trusted Environment

IP Address	MAC Address
Client 1 IP Address	MAC *A*
Client 2 IP Address	MAC *B*
Client 3 IP Address	MAC *C*

In distrusted environments, you can specify the **no-arp** statement to hide the MAC addresses of clients. When you specify the **no-arp** statement, DHCP does not automatically populate the ARP table with MAC address information from the DHCP PDU for each client. Instead, the system performs an ARP to obtain the MAC address of each client and obtains the MAC address of the immediately-attached device (for

example, a DSLAM). DHCP populates the ARP table with the same interface MAC address (for example, MAC *X* from a DSLAM interface) for each client:

Table 25: ARP Table in Distrusted Environment

IP Address	MAC Address
Client 1 IP Address	MAC *X*
Client 2 IP Address	MAC *X*
Client 3 IP Address	MAC *X*

To disable ARP table population:

1. Specify that you want to configure override options.
   - For DHCP local server:

     [edit system services dhcp-local-server]
     user@host# edit overrides

   - For DHCP relay:

     [edit forwarding-options dhcp-relay]
     user@host# edit overrides

2. Disable ARP table population with client-specific information. (DHCP local server and DHCP relay agent both support the **no-arp** statement.)
   - For DHCP local server:

     [edit system services dhcp-local-server overrides]
     user@host# set no-arp

   - For DHCP relay:

     [edit forwarding-options dhcp-relay overrides]
     user@host# set no-arp

Related Documentation

- Overriding Default DHCP Local Server Configuration Settings on page 101
- Deleting DHCP Local Server and DHCP Relay Override Settings on page 108
- Extended DHCP Local Server Overview on page 84
- DHCPv6 Local Server Overview on page 88
- Extended DHCP Relay Agent Overview on page 136
- Deleting DHCP Local Server and DHCP Relay Override Settings on page 108

Specifying the Maximum Number of DHCP Clients Per Interface

By default, there is no limit to the number of DHCP local server or DHCP relay clients allowed on an interface. However, you can override the default setting and specify the

maximum number of clients allowed per interface, in the range 1 through 500,000. When the number of clients on the interface reaches the specified limit, no additional DHCP Discover PDUs or DHCPv6 Solicit PDUs are accepted. When the number of clients subsequently drops below the limit, new clients are again accepted.

NOTE: The maximum number of DHCP (and DHCPv6) local server clients or DHCP relay clients can also be specified by Juniper Networks VSA 26-143 during client login. The VSA-specified value always takes precedence if the interface-client-limit number statement specifies a different number.

If the VSA-specified value differs with each client login, DHCP uses the largest limit set by the VSA until there are no clients on the interface.

To configure the maximum number of DHCP clients allowed per interface:

1. Specify that you want to configure override options.
   - For DHCP local server:

     [edit system services dhcp-local-server]
     user@host# edit overrides

   - For DHCPv6 local server:

     [edit system services dhcp-local-server dhcpv6]
     user@host# edit overrides

   - For DHCP relay agent:

     [edit forwarding-options dhcp-relay]
     user@host# edit overrides

2. Configure the maximum number of clients allowed per interface. (DHCP local server, DHCPv6 local server, and DHCP relay agent all support the **interface-client-limit** statement.)

   [edit system services dhcp-local-server overrides]
   user@host# set interface-client-limit *number*

Related Documentation

- Overriding Default DHCP Local Server Configuration Settings on page 101
- Deleting DHCP Local Server and DHCP Relay Override Settings on page 108
- Extended DHCP Local Server Overview on page 84
- Extended DHCP Relay Agent Overview on page 136

Managing DHCP Snooping Support

DHCP snooping provides DHCP security on the router by filtering incoming messages. When DHCP snooping is enabled, the router differentiates between trusted and untrusted interfaces, and forwards messages from trusted sources while rejecting the untrusted messages.

NOTE: In Junos OS Release 10.0 and earlier, DHCP snooping is enabled by default. In Junos OS Release 10.1 and later, DHCP snooping is disabled by default.

You can configure DHCP snooping support for the following:

- DHCP relay agent—You can override the router's default snooping configuration and specify that DHCP snooping is enabled or disabled globally, for a named group of interfaces, or for a specific interface within a named group.

  In a separate procedure, you can set a global configuration to specify whether DHCP relay agent forwards or drops snooped packets for all interfaces, only configured interfaces, or only nonconfigured interfaces. The router also uses the global DHCP relay agent snooping configuration to determine whether to forward or drop snooped BOOTREPLY packets.

- DHCP local server—Configure whether DHCP local server forwards or drops snooped packets for all interfaces, only configured interfaces, or only nonconfigured interfaces.

Related Documentation

- Configuring DHCP Snooping for DHCP Relay Agent on page 157
- Configuring DHCP Snooped Packets Forwarding Support for DHCP Local Server on page 104
- Example: Configuring DHCP Snooping Support for DHCP Relay Agent on page 191

Configuring DHCP Snooping for DHCP Relay Agent

DHCP relay agent uses a two-part configuration to determine how to handle DHCP snooped packets. First, you enable or disable snooping support for DHCP relay agent and, optionally, override the default snooping configuration. In the second procedure, you configure the forwarding action for snooped clients, which specifies whether DHCP relay agent forwards or drops snooped traffic.

To configure DHCP snooping for DHCP relay agent:

1. Enable or disable DHCP snooping. You can configure DHCP snooping globally, for a named group of interfaces, or for a specific interface.

   See "Enabling and Disabling DHCP Snooped Packets Support for DHCP Relay Agent" on page 158.

2. Configure snooped packets forwarding support.

   See "Configuring DHCP Snooped Packets Forwarding Support for DHCP Relay Agent" on page 160.

Related Documentation

- Managing DHCP Snooping Support on page 156
- Enabling and Disabling DHCP Snooped Packets Support for DHCP Relay Agent on page 158

- Configuring DHCP Snooped Packets Forwarding Support for DHCP Relay Agent on page 160
- Example: Configuring DHCP Snooping Support for DHCP Relay Agent on page 191

Enabling and Disabling DHCP Snooped Packets Support for DHCP Relay Agent

DHCP relay agent uses a two-part configuration to determine how to handle DHCP snooped packets. This topic describes the first procedure, in which you configure DHCP relay to either enable or disable support for snooped packets. The second procedure is described in "Configuring DHCP Snooped Packets Forwarding Support for DHCP Relay Agent" on page 160, and configures the **forward-snooped-clients** statement, which determines whether the snooped packets are forwarded or dropped, depending on the type of interface.

The router has a default global setting that specifies whether DHCP snooping support is enabled or disabled for DHCP relay. In Junos OS Release 10.0 and earlier, DHCP snooping is enabled by default. In Junos OS Release 10.1 and later, DHCP snooping is disabled by default.

You can override the default global DHCP snooping configuration and explicitly enable or disable DHCP snooping support. You can configure the explicit snooping support globally, for a group of interfaces, or for a specific interface in a group.

- To enable DHCP snooping support, include the **allow-snooped-clients** option in the **overrides** statement.
- To disable DHCP snooping support, include the **no-allow-snooped-clients** option in the **overrides** statement.

To enable or disable DHCP snooping support globally:

1. Specify that you want to configure DHCP relay agent.

   ```
   [edit]
   user@host# edit forwarding-options dhcp-relay
   ```

2. Specify that you want to override the default configuration.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit overrides
   ```

3. Enable or disable DHCP snooping support.

   - To enable DHCP snooping:

     ```
     [edit forwarding-options dhcp-relay overrides]
     user@host# set allow-snooped-clients
     ```

   - To disable DHCP snooping:

     ```
     [edit forwarding-options dhcp-relay overrides]
     user@host# set no-allow-snooped-clients
     ```

For example, to enable global DHCP snooping support :

```
forwarding-options {
  dhcp-relay {
    overrides {
      allow-snooped-clients;
    }
  }
}
```

To enable or disable DHCP snooping support for a group of interfaces:

1. Specify that you want to configure DHCP relay agent.

   ```
   [edit]
   user@host# edit forwarding-options dhcp-relay
   ```

2. Specify the named group.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit group group-name
   ```

3. Specify that you want to override the default configuration.

   ```
   [edit forwarding-options dhcp-relay group group-name]
   user@host# edit overrides
   ```

4. Enable or disable DHCP snooping support.

   - To enable DHCP snooping:

     ```
     [edit forwarding-options dhcp-relay group group-name overrides]
     user@host# set allow-snooped-clients
     ```

   - To disable DHCP snooping:

     ```
     [edit forwarding-options dhcp-relay group group-name overrides]
     user@host# set no-allow-snooped-clients
     ```

For example, to enable DHCP snooping support on all interfaces in group **boston**:

```
forwarding-options {
  dhcp-relay {
    group boston {
      overrides {
        allow-snooped-clients;
      }
    }
  }
}
```

To enable or disable DHCP snooping support on a specific interface:

1. Specify that you want to configure DHCP relay agent.

   ```
   [edit]
   user@host# edit forwarding-options dhcp-relay
   ```

2. Specify the named group containing the interface.

   ```
   [edit forwarding-options dhcp-relay]
   ```

user@host# **edit group** *group-name*

3. Specify the interface for which you want to configure DHCP snooping.

   [edit forwarding-options dhcp-relay group *group-name*]
   user@host# **edit interface** *interface-name*

4. Specify that you want to override the default configuration on the interface.

   [edit forwarding-options dhcp-relay group *group-name* interface *interface-name*]
   user@host# **edit overrides**

5. Enable or disable DHCP snooping support.

   - To enable DHCP snooping:

     [edit forwarding-options dhcp-relay group *group-name* interface *interface-name* overrides]
     user@host# **set allow-snooped-clients**

   - To disable DHCP snooping:

     [edit forwarding-options dhcp-relay group *group-name* interface *interface-name* overrides]
     user@host# **set no-allow-snooped-clients**

For example, to disable DHCP snooping support on interface **ge-2/1/8.0**, which is in group **boston**:

```
forwarding-options {
  dhcp-relay {
    group boston {
      interface ge-2/1/8.0 {
        overrides {
          no-allow-snooped-clients;
        }
      }
    }
  }
}
```

Related Documentation

- Configuring DHCP Snooped Packets Forwarding Support for DHCP Relay Agent on page 160
- Managing DHCP Snooping Support on page 156
- Overriding the Default DHCP Relay Configuration Settings on page 150

Configuring DHCP Snooped Packets Forwarding Support for DHCP Relay Agent

You can configure how DHCP relay agent handles DHCP snooped packets. Depending on the configuration, DHCP relay agent either forwards or drops the snooped packets it receives.

DHCP relay uses a two-part configuration to determine how to handle DHCP snooped packets. This topic describes how you use the **forward-snooped-clients** statement to manage whether DHCP relay agent forwards or drops snooped packets, depending on

the type of interface on which the packets are snooped. In the other part of the DHCP relay agent snooping configuration, which is described in "Enabling and Disabling DHCP Snooped Packets Support for DHCP Relay Agent" on page 158, you enable or disable the DHCP relay snooping feature.

Table 26 on page 161 shows the action the router takes on snooped packets when DHCP snooping is enabled by the **allow-snooped-clients** statement. Table 27 on page 161 shows the action the router takes on snooped packets when DHCP snooping is disabled by the **no-allow-snooped-clients** statement.

The router also uses the configuration of the DHCP relay agent forwarding support to determine how to handle snooped BOOTREPLY packets. Table 28 on page 162 shows the action the router takes for the snooped BOOTREPLY packets.

NOTE: Configured interfaces are those interfaces that have been configured with the group statement in the [edit forwarding-options dhcp-relay] hierarchy. Non-configured interfaces are those that are in the logical system/routing instance but have not been configured by the group statement.

Table 26: Actions for DHCP Relay Agent Snooped Packets When DHCP Snooping Is Enabled

forward-snooped-clients Configuration	Action on Configured Interfaces	Action on Non-Configured Interfaces
forward-snooped-clients not configured	snooped packets result in subscriber creation	dropped
all-interfaces	forwarded	forwarded
configured-interfaces	forwarded	dropped
non-configured-interfaces	snooped packets result in subscriber creation	forwarded

Table 27: Actions for DHCP Relay Agent Snooped Packets When DHCP Snooping Is Disabled

forward-snooped-clients Configuration	Action on Configured Interfaces	Action on Non-Configured Interfaces
forward-snooped-clients not configured	dropped	dropped
all-interfaces	dropped	forwarded
configured-interfaces	dropped	dropped
non-configured-interfaces	dropped	forwarded

Table 28: Actions for Snooped BOOTREPLY Packets

forward-snooped-clients Configuration	Action
forward-snooped-clients not configured	snooped **BOOTREPLY** packets dropped if client is not found
forward-snooped-clients all configurations	snooped **BOOTREPLY** packets forwarded if client is not found

To configure DHCP snooped packet forwarding and BOOTREPLY snooped packet forwarding for DHCP relay agent:

1. Specify that you want to configure DHCP relay agent.

   ```
   [edit]
   user@host# edit forwarding-options dhcp-relay
   ```

2. Enable DHCP snooped packet forwarding.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit forward-snooped-clients
   ```

3. Specify the interfaces that are supported for snooped packet forwarding.

   ```
   [edit forwarding-options dhcp-relay forward-snooped-clients]
   user@host# set (all-interfaces | configured-interfaces | non-configured-interfaces)
   ```

For example, to configure DHCP relay agent to forward DHCP snooped packets on only configured interfaces:

```
[edit]
forwarding-options {
  dhcp-relay {
    forward-snooped-clients configured-interfaces;
  }
}
```

Related Documentation

- Managing DHCP Snooping Support on page 156
- Enabling and Disabling DHCP Snooped Packets Support for DHCP Relay Agent on page 158

DHCP Auto Logout Overview

This topic provides an introduction to the optional DHCP auto logout feature and includes the following sections:

Auto Logout Overview

Auto logout is an optional configuration for DHCP local server and DHCP relay agent that improves the efficiency of DHCP IP address assignment. Auto logout enables IP addresses to be immediately released and returned to the address pool when the addresses are no longer used by DHCP clients. DHCP can then assign the addresses to other clients. Without auto logout, an IP address is blocked for the entire lease period, and DHCP must wait until the address lease time expires before reusing the address.

Auto logout is particularly useful when DHCP uses long lease times for IP address assignments and to help avoid allocating duplicate IP addresses for a single client. For example, you might have an environment that includes set-top boxes (STB) that are often upgraded or replaced. Each time a STB is changed, the new STB repeats the DHCP discover process to obtain client configuration information and an IP address. DHCP views the new STB as a completely new client and assigns a new IP address—the previous IP address assigned to the client (the old STB) remains blocked and unavailable until the lease expires. If auto logout is configured in this situation, DHCP recognizes that the new STB is actually the same client and then immediately releases the original IP address. DHCP relay agent acts as a proxy client for auto logout and sends a DHCP release message to the DHCP server.

How DHCP Identifies and Releases Clients

The auto logout feature requires that DHCP explicitly identify clients. By default, DHCP local server and DHCP relay agent identify clients based on MAC address or Client Identifier. However, in some cases this type of identification might not be sufficient. For example, in the previous STB example, each STB has a different MAC address, so DHCP incorrectly assumes that an upgraded or replacement STB is a new client.

In order to explicitly identify clients, auto logout uses a secondary identification method when the primary identification method is unsuccessful—the primary method is considered unsuccessful if the MAC address or Client Identifier does not match that of an existing client. The secondary identification method is based on the DHCP option 60 and option 82 information in DHCP discover messages.

Both the primary and secondary identification methods use subnet information to differentiate between clients. The primary identification method differentiates between two clients with the same MAC address (or same Client Identifier) if the clients are on different subnets. Similarly, the secondary identification method considers two clients as different if they have the same option 60 and option 82 information, but different subnets.

DHCP local server and DHCP relay agent perform the following operations when auto logout is enabled and the secondary identification method identifies a duplicate client (that is, the discovery packet is from an existing client).

- DHCP local server immediately releases the existing address.
- DHCP relay agent immediately releases the existing client and then sends a DHCP release packet to the DHCP server. Sending the release packet ensures that DHCP relay and the DHCP server are synchronized.

NOTE: If the DHCP relay agent is in snoop mode, DHCP relay releases the client but does not send a release packet to the DHCP server if the discover packet is for a passive client (a client added as a result of snooped packets) or if the discover packet is a snooped packet.

Option 60 and Option 82 Requirements

DHCP local server requires that the received discover packet include both DHCP option 60 and option 82. If either option is missing, DHCP local server cannot perform the secondary identification method and auto logout is not used.

DHCP relay agent requires that the received discover packet contain DHCP option 60. DHCP relay determines the option 82 value based on the guidelines provided in "DHCP Relay Agent Option 82 Value for Auto Logout" on page 164.

Related Documentation

- Automatically Logging Out DHCP Clients on page 107
- DHCP Relay Agent Option 82 Value for Auto Logout on page 164

DHCP Relay Agent Option 82 Value for Auto Logout

Table 29 on page 164 indicates how the DHCP relay agent determines the option 82 value used for the client auto logout feature. Depending on the configuration settings, DHCP relay agent takes the action indicated in the right column.

Table 29: DHCP Relay Agent Option 82 Value for Auto Logout

DHCP Relay Agent Configuration Settings					
DHCP Relay Configured with Option 82	Discover Packet Contains Option 82	Override "trust-option-82"	Override "always-write-option-82"	giaddr in non-snooped packet	Action Taken
No	No	–	–	–	No secondary search performed
No	Yes	Yes	–	–	Use option 82 from packet
No	Yes	No	–	Zero	Drop packet
No	Yes	No	–	Non-zero	Use option 82 from packet
Yes	No	–	–	–	Use configured option 82

Table 29: DHCP Relay Agent Option 82 Value for Auto Logout *(continued)*

DHCP Relay Agent Configuration Settings					
DHCP Relay Configured with Option 82	Discover Packet Contains Option 82	Override "trust-option-82"	Override "always-write-option-82"	giaddr in non-snooped packet	Action Taken
Yes	Yes	No	–	Zero	Drop packet
Yes	Yes	No	No	Non-zero	Use option 82 from packet
Yes	Yes	No	Yes	Non-zero	Overwrite the configured option 82
Yes	Yes	Yes	No	–	Use option 82 from packet
Yes	Yes	Yes	Yes	–	Overwrite the configured option 82

Related Documentation

- DHCP Auto Logout Overview on page 105
- Automatically Logging Out DHCP Clients on page 107

Automatically Logging Out DHCP Clients

You can configure the extended DHCP local server and extended DHCP relay to automatically log out DHCP clients. Auto logout immediately releases an existing client when DHCP receives a discover packet that has the same DHCP option 60 and DHCP option 82 information as the existing client. DHCP then releases the existing client IP address without waiting for the normal lease expiration.

NOTE: When the existing client is released, the new client undergoes the normal authentication process. The new client might not receive the same IP address as the original client.

To configure DHCP client auto logout:

1. Specify that you want to configure override options.
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# edit overrides
     ```

   - For DHCP relay agent:

```
[edit forwarding-options dhcp-relay]
user@host# edit overrides
```

2. Enable auto logout. (DHCP local server and DHCP relay agent both support the **client-discover-match** statement.)

   - For DHCP local server:

     ```
     [edit system services dhcp-local-server overrides]
     user@host# set client-discover-match
     ```

   - For DHCP relay:

     ```
     [edit forwarding-options dhcp-relay overrides]
     user@host# set client-discover-match
     ```

NOTE: If you change the auto logout configuration, existing clients continue to use the auto logout setting that was configured when they logged in. New clients use the new setting.

Related Documentation

- DHCP Auto Logout Overview on page 105
- Deleting DHCP Local Server and DHCP Relay Override Settings on page 108
- Extended DHCP Local Server Overview on page 84
- Extended DHCP Relay Agent Overview on page 136

Sending Release Messages When Clients Are Deleted

By default, when DHCP relay and relay proxy delete a client, they do not send a release message to the DHCP server. You can override the default behavior and configure DHCP relay and relay proxy to send a release message whenever they delete a client. The release message sent by DHCP relay and relay proxy includes option 82 information.

NOTE: In Junos OS Release 10.1 and earlier, DHCP relay sends a release message to the DHCP server when the client-discover-match statement is included as a DHCP relay override. In Junos OS Release 10.2 and later, you must include the send-release-on-delete statement to configure DHCP relay and relay proxy to send the release message when the client-discover-match statement is included.

To send a release message:

1. Specify that you want to configure overrides.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit overrides
   ```

2. Specify that you want DHCP relay and relay proxy to send a release message when clients are deleted.

```
[edit forwarding-options dhcp-relay overrides]
user@host# set send-release-on-delete
```

Related Documentation

- Extended DHCP Relay Agent Overview on page 136
- Overriding the Default DHCP Relay Configuration Settings on page 150

Disabling DHCP Relay

You can disable DHCP relay on all interfaces or a group of interfaces.

To disable DHCP relay agent:

1. Specify that you want to configure override options.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit overrides
   ```

2. Disable the DHCP relay agent.

   ```
   [edit forwarding-options dhcp-relay overrides]
   user@host# set disable-relay
   ```

Related Documentation

- Extended DHCP Relay Agent Overview on page 136
- Deleting DHCP Local Server and DHCP Relay Override Settings on page 108

Disabling Automatic Binding of Stray DHCP Requests

DHCP requests that are received but have no entry in the database are known as stray requests. By default, DHCP relay and DHCP relay proxy attempt to bind the requesting client by creating a database entry and forwarding the request to the DHCP server. If the server responds with an ACK, the client is bound and the ACK is forwarded to the client. If the server responds with a NAK, the database entry is deleted and the NAK is forwarded to the client. This behavior occurs regardless of whether authentication is configured.

You can override the default configuration at the global level, for a named group of interfaces, or for a specific interface within a named group. Overriding the default causes DHCP relay and DHCP relay proxy to drop all stray requests instead of attempting to bind the clients.

NOTE: Beginning with Junos OS Release 10.4, automatic binding of stray requests is enabled by default.

In Junos OS Release 10.3 and earlier releases, automatic binding of stray requests is disabled by default. In those releases, DHCP relay drops stray requests and forwards a NAK to the client when authentication is configured. Otherwise, DHCP relay attempts to bind the requesting client. In those releases, DHCP relay proxy always drops stray requests and forwards a NAK to the client, regardless of the authentication configuration.

- To disable automatic binding behavior, include the **no-bind-on-request** statement when you configure DHCP overrides at the global, group, or interface level.

  ```
  [edit forwarding-options dhcp-relay overrides]
  user@host# set no-bind-on-request (DHCP Relay Agent)
  ```

The following two examples show a configuration that disables automatic binding of stray requests for a group of interfaces and a configuration that disables automatic binding on a specific interface.

To disable automatic binding of stray requests on a group of interfaces:

1. Specify the named group.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit group boston
   ```

2. Specify that you want to configure overrides.

   ```
   [edit forwarding-options dhcp-relay group boston]
   user@host# edit overrides
   ```

3. Disable automatic binding for the group.

   ```
   [edit forwarding-options dhcp-relay group boston overrides]
   user@host# set no-bind-on-request (DHCP Relay Agent)
   ```

To disable automatic binding of stray requests on a specific interface:

1. Specify the named group of which the interface is a member.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit group boston
   ```

2. Specify the interface on which you want to disable automatic binding.

   ```
   [edit forwarding-options dhcp-relay group boston]
   user@host# edit interface fe-1/0/1.2
   ```

3. Specify that you want to configure overrides.

   ```
   [edit forwarding-options dhcp-relay group boston interface fe-1/0/1.2]
   user@host# edit overrides
   ```

4. Disable automatic binding on the interface.

   ```
   [edit forwarding-options dhcp-relay group boston interface fe-1/0/1.2 overrides]
   user@host# set no-bind-on-request (DHCP Relay Agent)
   ```

Related Documentation

- Extended DHCP Relay Agent Overview on page 136
- Overriding the Default DHCP Relay Configuration Settings on page 150

Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers

You can configure the extended DHCP relay agent to use the DHCP vendor class identifier option (option 60) in DHCP client packets to forward client traffic to specific DHCP servers. This feature is useful in network environments where DHCP clients access services provided by multiple vendors and DHCP servers. For example, a DHCP client might gain Internet access from a particular DHCP server provided by one vendor, and access IPTV service from a different DHCP server provided by another vendor. The option 60 string enables vendors to include vendor-specific information in DHCP client packets.

You can configure option 60 support globally or for a named group of interfaces. You can also configure option 60 support for the extended DHCP relay agent on a per logical system and per routing instance basis.

To configure the DHCP relay agent to use option 60 vendor-specific information to select a DHCP server to which to forward the client packets:

1. Specify that you want to configure option 60 support.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit relay-option-60
   ```

2. (Optional) Configure the DHCP relay to use matching option 60 strings to process client traffic.

   See “Using Matching Option 60 Strings to Process DHCP Client Traffic” on page 169.

3. (Optional) Configure the DHCP relay to use nonmatching option 60 strings to process client traffic.

   See “Using Nonmatching Option 60 Strings to Process DHCP Client Traffic” on page 172.

4. (Optional) Display a count of the number of discarded packets with option 60 information.

   See “Displaying a Count of Discarded DHCP Packets with Option 60 Information” on page 172.

Related Documentation

- Using Matching Option 60 Strings to Process DHCP Client Traffic on page 169
- Using Nonmatching Option 60 Strings to Process DHCP Client Traffic on page 172
- Displaying a Count of Discarded DHCP Packets with Option 60 Information on page 172

Using Matching Option 60 Strings to Process DHCP Client Traffic

Configuring option 60 support helps you manage multivendor networks by enabling the extended DHCP relay agent to compare option 60 vendor-specific strings received in DHCP client packets against a list of ASCII or hexadecimal strings that you configure on the router.

You can configure exact match or partial match criteria for option 60 string-to-DHCP server mapping and specify either the **ascii** statement (to define a nonempty ASCII match

string of 1 through 255 alphanumeric characters) or the **hexadecimal** statement (to define a hexadecimal match string of 1 through 255 hexadecimal characters [0 through 9, a through f, A through F]).

When you configure a partial match, the option 60 string can contain a superset of the configured ASCII or hexadecimal string, provided that the leftmost characters of the option 60 string entirely match the characters in the configured match string. For a partial match, the longest match rule applies. For example, the extended DHCP relay agent matches the string “test123” before it matches the string “test”.

If the option 60 string received in the DHCP client packet matches the configured ASCII or hexadecimal string, you can define one of the following actions for the associated DHCP client packets:

- Relay client traffic to a group of specific DHCP relay servers that provide the requested client service.

  The DHCP client packet is relayed to all of the servers in the specified group that map to the vendor class identifier information provided in the option 60 string. To configure the named group of DHCP relay servers, which are also referred to as vendor-option servers, include the **server-group** statement at the **[edit forwarding-options dhcp-relay]** hierarchy level, as described in “Configuring Server Groups” on page 175.

  The following additional considerations apply when you configure an ASCII or hexadecimal match string:

  - You can configure the same ASCII or hexadecimal match string as both an exact (**equals**) match and as a partial (**starts-with**) match. In that case, the exact string match configured with the **equals** statement takes precedence over the partial string match configured with the **starts-with** statement.
  - A server group can contain multiple server addresses and can map to more than one match string.
  - You can configure an unlimited number of match strings.
  - The use of wildcard attributes in match strings is not supported.
- Forward client traffic to a specific extended DHCP local server.
- Drop (discard) the packets. Specifying that certain DHCP client packets be dropped can be useful when DHCP clients request services that are invalid or no longer supported.

1. To configure match criteria:
   - To specify an exact, left-to-right match of the configured match string with the option 60 string, use the **vendor-option equals** statement:
     - To specify a nonempty ASCII match string.

       ```
       [edit forwarding-options dhcp-relay relay-option-60]
       user@host# set vendor-option equals ascii video55
       ```


- To specify a hexadecimal match string.

  ```
  [edit forwarding-options dhcp-relay relay-option-60]
  user@host# set vendor-option equals hexadecimal ff
  ```

- To specify a partial match of the configured match string with the option 60 string, use the **vendor-option starts-with** statement:
  - To specify a partial ASCII match string.

    ```
    [edit forwarding-options dhcp-relay relay-option-60]
    user@host# set vendor-option starts-with ascii video
    ```

  - To specify a partial hexadecimal match string.

    ```
    [edit forwarding-options dhcp-relay relay-option-60]
    user@host# set vendor-option starts-with hexadecimal ff
    ```

2. To configure the action to take when the DHCP client packet matches the configured ASCII or hexadecimal string:
   - To relay client traffic to a group of specific DHCP relay servers that provide the requested client service.

     ```
     [edit forwarding-options dhcp-relay relay-option-60 vendor-option equals ascii
       video55]
     user@host# set relay-server-group
     ```

     The DHCP client packet is relayed to all of the servers specified in the **server-group** statement at the **[edit forwarding-options dhcp-relay]** hierarchy level that map to the vendor class identifier information provided in the option 60 string.

   - To forward client traffic to a specific extended DHCP local server.

     ```
     [edit forwarding-options dhcp-relay relay-option-60 vendor-option equals ascii
       video55]
     user@host# set local-server-group
     ```

     To configure an extended DHCP local server, include the **dhcp-local-server** statement at the **[edit system services]** hierarchy level. For information about configuring and using the extended DHCP local server, see “Extended DHCP Local Server Overview” on page 84.

   - To drop (discard) the packets:

     ```
     [edit forwarding-options dhcp-relay relay-option-60 vendor-option equals ascii
       video55]
     user@host# set drop
     ```

Related Documentation

- Example: Using Option 60 Strings to Forward DHCP Client Traffic on page 193
- Example: Using Option 60 Strings to Drop DHCP Client Traffic on page 194

Using Nonmatching Option 60 Strings to Process DHCP Client Traffic

If the option 60 string received in the DHCP client packet does not match the configured ASCII or hexadecimal string, you can specify the default action that the DHCP relay agent uses for the associated DHCP client packets.

In rare instances, the extended DHCP relay agent might receive a DHCP client packet with an option 60 string of zero (0) length. In this case, there is nothing in the option 60 string against which to match. As a result, such packets are treated as if they contained nonmatching option 60 strings; that is, they can be relayed to a default DHCP relay server, forwarded to a default DHCP extended local server, or dropped.

- To relay client traffic to a default extended DHCP relay server that you specify:

  ```
  [edit forwarding-options dhcp-relay relay-option-60 vendor-option]
  user@host# set default-relay-server-group relayServer16
  ```

- To forward client traffic to a default extended DHCP local server that you specify:

  ```
  [edit forwarding-options dhcp-relay relay-option-60 vendor-option]
  user@host# set default-local-server-group localServer25
  ```

- To drop (discard) the nonmatching packets:

  ```
  [edit forwarding-options dhcp-relay relay-option-60 vendor-option]
  user@host# set drop
  ```

Related Documentation

- Example: Using Option 60 Strings to Forward DHCP Client Traffic on page 193
- Example: Using Option 60 Strings to Drop DHCP Client Traffic on page 194

Displaying a Count of Discarded DHCP Packets with Option 60 Information

To display the number of discarded DHCP client packets containing option 60 vendor-specific information, use the following operational command:

- **show dhcp relay statistics**

Related Documentation

- For information about using this command, see the *Junos OS Routing Protocols and Policies Command Reference*.

Enabling and Disabling Insertion of Option 82 Information

You can enable or disable support for the DHCP relay agent information option (option 82) in packets destined for a DHCP server. You can configure option 82 support globally or for a named group of interfaces.

To restore the default behavior (option 82 information is not inserted into DHCP packets), you use the **delete relay-option-82** statement.

To configure support for the DHCP relay agent information option 82, you use the **relay-option-82** statement.

The following sections describe the option 82 operations you can configure:

Configuring Agent Circuit ID Information

You use the **relay-option-82** statement to enable insertion of option 82 information in DHCP packets. You must also specify at least the **circuit-id** statement to include the Agent Circuit ID suboption (suboption 1) of the DHCP relay agent information option.

If you specify the **circuit-id** statement, the format of the Agent Circuit ID information for Fast Ethernet (**fe**) or Gigabit Ethernet (**ge**) interfaces is one of the following, depending on your network configuration:

- For Fast Ethernet or Gigabit Ethernet interfaces that do not use virtual local area networks (VLANs) or stacked VLANs (S-VLANs):

  (fe | ge)-*fpc/pic/port*

- For Fast Ethernet or Gigabit Ethernet interfaces that use VLANs:

  (fe | ge)-*fpc/pic/port*:*vlan-id*

- For Fast Ethernet or Gigabit Ethernet interfaces that use S-VLANs:

  (fe | ge)-*fpc/pic/port*:*svlan-id-vlan-id*

To enable insertion of option 82 information:

1. Specify that you want to configure option 82 support.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit relay-option-82
   ```

2. Specify insertion of the Agent Circuit ID suboption.

   ```
   [edit forwarding-options dhcp-relay relay-option-82]
   user@host# set circuit-id
   ```

Configuring an Option 82 Prefix

You can include an optional prefix to the base option 82 information in DHCP packets destined for a DHCP server.

The prefix is separated from the option 82 Agent Circuit ID information by a colon (:), and can include any combination of the **host-name**, **logical-system-name**, and **routing-instance-name** options. The DHCP relay agent obtains the values for the **host-name**, **logical-system-name**, and **routing-instance-name** as follows:

- If you include the **host-name** option, the DHCP relay agent uses the hostname of the router configured with the **host-name** statement at the **[edit system]** hierarchy level.

- If you include the **logical-system-name** option, the DHCP relay agent uses the logical system name configured with the **logical-system** statement at the **[edit logical-system]** hierarchy level.
- If you include the **routing-instance-name** option, the DHCP relay agent uses the routing instance name configured with the **routing-instance** statement at the **[edit routing-instances]** hierarchy level or at the **[edit logical-system *logical-system-name* routing-instances]** hierarchy level.

If you include the hostname and either or both of the logical system name and the routing instance name in the prefix, the hostname is followed by a forward slash (/). If you include both the logical system name and the routing instance name in the prefix, these values are separated by a semicolon (;).

The following examples show several possible formats for the Agent Circuit ID information when you specify the **prefix** statement for Fast Ethernet (**fe**) or Gigabit Ethernet (**ge**) interfaces with S-VLANs.

- If you include only the hostname in the prefix for Fast Ethernet or Gigabit Ethernet interfaces with S-VLANs:

  hostname:(fe | ge)-*fpc/pic/port*:*svlan-id-vlan-id*

- If you include only the logical system name in the prefix for Fast Ethernet or Gigabit Ethernet interfaces with S-VLANs:

  logical-system-name:(fe | ge)-*fpc/pic/port*:*svlan-id-vlan-id*

- If you include only the routing instance name in the prefix for Fast Ethernet or Gigabit Ethernet interfaces with S-VLANs:

  routing-instance-name:(fe | ge)-*fpc/pic/port*:*svlan-id-vlan-id*

- If you include both the hostname and the logical system name in the prefix for Fast Ethernet or Gigabit Ethernet interfaces with S-VLANs:

  host-name/logical-system-name:(fe | ge)-*fpc/pic/port*:*svlan-id-vlan-id*

- If you include both the logical system name and the routing instance name in the prefix for Fast Ethernet or Gigabit Ethernet interfaces with S-VLANs:

  logical-system-name;*routing-instance-name*:(fe | ge)-*fpc/pic/port*:*svlan-id-vlan-id*

- If you include the hostname, logical system name, and routing instance name in the prefix for Fast Ethernet or Gigabit Ethernet interfaces with S-VLANs:

  host-name/logical-system-name;*routing-instance-name*:(fe | ge)-*fpc/pic/port*:*svlan-id-vlan-id*

For Fast Ethernet or Gigabit Ethernet interfaces that use VLANs but not S-VLANs, only the ***vlan-id*** value appears in the Agent Circuit ID format. For Fast Ethernet or Gigabit Ethernet interfaces that do not use VLANs or S-VLANs, neither the ***vlan-id*** value nor the ***svlan-id*** value appears.

To configure an optional prefix with the option 82 information:

1. Specify that you want to configure option 82 support.

```
[edit forwarding-options dhcp-relay]
user@host# edit relay-option-82
```

2. Specify insertion of the Agent Circuit ID information.

```
[edit forwarding-options dhcp-relay relay-option-82]
user@host# edit circuit-id
```

3. Specify that the prefix is included in the option 82 information. In this example, the prefix includes the hostname and logical system name

```
[edit forwarding-options dhcp-relay relay-option-82 circuit-id]
user@host# set prefix host-name logical-system-name
```

Using a Textual Description in Option 82

By default, when DHCP option 82 is inserted into client packets, the Agent Circuit ID suboption includes the interface identifier. You can optionally configure that the Agent Circuit ID suboption include the textual description that is configured for the interface instead of the interface identifier. You can use the textual description for either the logical interface or the device interface.

You can include the textual interface description in the Agent Circuit ID suboption for static interfaces. The textual description is configured using the **description** statement at the **[edit interfaces *interface-name*]** hierarchy level. If you specify that the textual description is used and no description is configured for the interface, DHCP relay defaults to using the interface identifier.

To configure the DHCP relay option 82 suboption to include the textual interface description:

1. Specify that you want to configure option 82 support.

```
[edit forwarding-options dhcp-relay]
user@host# edit relay-option-82
```

2. Specify insertion of the Agent Circuit ID information.

```
[edit forwarding-options dhcp-relay relay-option-82]
user@host# edit circuit-id
```

3. Specify that the textual description is included in the option 82 information. In this example, the option 82 information includes the description used for the device interface.

```
[edit forwarding-options dhcp-relay relay-option-82 circuit-id]
user@host# set use-interface-description device
```

Configuring Server Groups

You can configure a named group of DHCP servers for use by the extended DHCP relay agent on the router.

You specify the name of the DHCP server group and the IP addresses of one or more DHCP servers that belong to this group. You can configure a maximum of five IP addresses per named server group.

To configure a named server group:

1. Specify the name of the server group.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# set server-group myServerGroup
   ```

2. Add the IP addresses of the DHCP servers belonging to the group.

   ```
   [edit forwarding-options dhcp-relay server-group myServerGroup]
   user@host# set 192.168.100.50
   user@host# set 192.168.100.75
   ```

Configuring Active Server Groups

You can configure an active server group. Using an active server group enables you to apply a common DHCP relay agent configuration to a named group of DHCP server addresses.

To configure an active server group:

- Specify the name of the active server group.

  ```
  [edit forwarding-options dhcp-relay]
  user@host# set active-server-group myServerGroup
  ```

To create an active server group as a global DHCP relay agent configuration option, include the **active-server-group** statement at the **[edit forwarding-options dhcp-relay]** hierarchy level. To have the group apply only to a named group of interfaces, include the **active-server-group** statement at the **[edit forwarding-options dhcp-relay group *group-name*]** hierarchy level.

Including the **active-server-group** statement at the **[edit forwarding-options dhcp-relay group *group-name*]** hierarchy level (as a group-specific option) overrides the effect of including the **active-server-group** statement at the **[edit forwarding-options dhcp-relay]** hierarchy level as a global option.

Enabling DHCP Relay Proxy Mode

You can enable DHCP relay proxy mode on all interfaces or a group of interfaces.

To enable DHCP relay proxy mode:

1. Specify that you want to configure override options.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit overrides
   ```

2. Enable DHCP relay proxy mode.

   ```
   [edit forwarding-options dhcp-relay overrides]
   user@host# set proxy-mode
   ```

Related Documentation

- DHCP Relay Proxy Overview on page 138
- Overriding the Default DHCP Relay Configuration Settings on page 150

Attaching Dynamic Profiles to DHCP Subscriber Interfaces

This topic describes how to attach a dynamic profile to a DHCP subscriber interface. When a DHCP subscriber logs in, the specified dynamic profile is instantiated and the services defined in the profile are applied to the interface.

This topic contains the following sections:

Attaching a Dynamic Profile to All DHCP Subscriber Interfaces

To attach a dynamic profile to all DHCP subscriber interfaces:

1. At the DHCP configuration hierarchy, use the **dynamic-profile** statement to specify the name of the dynamic profile to attach to all interfaces.
   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# set dynamic-profile vod-profile-22
     ```

   - For DHCP relay agent:

     ```
     [edit forwarding-options dhcp-relay]
     user@host# set dynamic-profile vod-profile-west
     ```

2. Optionally, you can configure the attribute to use when attaching the specified profile.

   You can include either the **aggregate-clients** option to enable multiple DHCP subscribers to share the same VLAN logical interface, or the **use-primary** option to specify that the primary dynamic profile is used. The **aggregate-clients** option does not apply to demux subscriber interfaces. The two options are mutually exclusive.

   - To enable multiple subscribers to share the same VLAN logical interface:

     ```
     [edit system services dhcp-local-server dynamic-profile]
     user@host# set aggregate-clients merge
     ```

   - To use the primary dynamic profile:

     ```
     [edit forwarding-options dhcp-relay dynamic-profile]
     user@host# set use-primary subscriber_profile
     ```

Attaching a Dynamic Profile to a Group of DHCP Subscriber Interfaces

To attach a dynamic profile to a group of interfaces:

Before you begin:

- Configure the interface group.

  See "Grouping Interfaces with Common DHCP Configurations" on page 98.

1. At the DHCP configuration hierarchy, specify the name of the interface group and the dynamic profile to attach to the group.

   - For DHCP local server:

     ```
     [edit system services dhcp-local-server]
     user@host# set group boston dynamic-profile vod-profile-42
     ```

   - For DHCP relay agent:

     ```
     [edit forwarding-options dhcp-relay]
     user@host# set group quebec dynamic-profile vod-profile-east
     ```

2. Optionally, you can configure the attribute to use when attaching the specified profile.

   You can include either the **aggregate-clients** option to enable multiple DHCP subscribers to share the same VLAN logical interface, or the **use-primary** option to specify that the primary dynamic profile is used. The **aggregate-clients** option does not apply to demux subscriber interfaces. The two options are mutually exclusive.

   - To enable multiple subscribers to share the same VLAN logical interface:

     ```
     [edit system services dhcp-local-server dynamic-profile]
     user@host# set aggregate-clients merge
     ```

   - To use the primary dynamic profile:

     ```
     [edit forwarding-options dhcp-relay dynamic-profile]
     user@host# set use-primary subscriber_profile
     ```

Related Documentation

- Dynamic Profiles Overview on page 325
- Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 89
- Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces on page 411

Verifying and Managing DHCP Relay Configuration

Purpose View or clear address bindings or statistics for extended DHCP relay agent clients:

Action

- To display the address bindings for extended DHCP relay agent clients:

  ```
  user@host> show dhcp relay binding
  ```

- To display extended DHCP relay agent statistics:

  ```
  user@host> show dhcp relay statistics
  ```

- To clear the binding state of DHCP relay agent clients:

  user@host> **clear dhcp relay binding**

- To clear all extended DHCP relay agent statistics:

  user@host> **clear dhcp relay statistics**

Related Documentation

- For more information, see the *Junos OS System Basics and Services Command Reference*

Tracing Extended DHCP Operations

Both the extended DHCP local server and the extended DHCP relay agent support tracing operations. DHCP tracing operations track extended DHCP operations and record them in a log file. The error descriptions captured in the log file provide detailed information to help you solve problems.

You can configure DHCP trace operations at the global level or at the interface level. If you configure interface-level trace operations, you can specify tracing for a range of interfaces or an individual interface.

By default, nothing is traced. When you enable the tracing operation, the default tracing behavior is as follows:

- Important events for both global and per-interface tracing are logged in a file called **jdhcpd** located in the **/var/log** directory. You cannot change the directory (**/var/log**) in which trace files are located.
- When the file **jdhcpd** reaches 128 kilobytes (KB), it is renamed **jdhcpd.0**, then **jdhcpd.1**, and so on, until there are three trace files. Then the oldest trace file (**jdhcpd.2**) is overwritten.

  You can optionally configure the maximum file size to be from 10 KB through 1 gigabyte (GB). You can also specify the number of trace files to be from 2 through 1000. (For more information about how log files are created, see the *Junos OS System Log Messages Reference*.)

- Log files can be accessed only by the user who configures the tracing operation.

To specify that you want to configure global DHCP tracing operations.

- For DHCP local server:

  [edit system services dhcp-local-server]
  user@host# **edit traceoptions**

- For DHCP relay:

  [edit forwarding-options dhcp-relay]
  user@host# **edit traceoptions**

For information about configuring per-interface tracing options, see “Tracing Extended DHCP Operations for Specific Interfaces” on page 127.

The extended DHCP traceoptions operations are described in the following sections:

Configuring the Extended DHCP Log Filename

By default, the name of the file that records trace output is **jdhcpd**. You can specify a different name by including the **file** option:

To configure the filename for DHCP local server and DHCP relay agent tracing operations, specify the name of the file used for the trace output. (DHCP local server and DHCP relay agent both support the **file** option for the **traceoptions** statement.)

```
[edit system services dhcp-local-server traceoptions]
user@host# set file filename
```

Configuring the Number and Size of Extended DHCP Log Files

By default, when the trace file reaches 128 kilobytes (KB) in size, it is renamed ***filename*.0**, then ***filename*.1**, and so on, until there are three trace files. Then the oldest trace file (***filename*.2**) is overwritten.

You can optionally configure the maximum file size to be from 10 KB through 1 gigabyte (GB). You can also specify the number of trace files to be from 2 through 1000.

For example, you can set the maximum file size to 2 MB, and the maximum number of files to 20. When the file that receives the output of the tracing operation (***filename***) reaches 2 MB, ***filename*** is renamed ***filename*.0**, and a new file called ***filename*** is created. When the new ***filename*** reaches 2 MB, ***filename*.0** is renamed ***filename*.1** and ***filename*** is renamed ***filename*.0**. This process repeats until there are 20 trace files. Then the oldest file (***filename*.19**) is overwritten by the newest file (***filename*.0**).

To configure the number and size of trace files, specify the name, number, and size of the file used for the trace output. DHCP local server and DHCP relay agent both support the **files** and **size** options for the **traceoptions** statement and the **interface-traceoptions** statement.

```
[edit system services dhcp-local-server traceoptions]
user@host# set file filename files number size size
```

Configuring Access to the Extended DHCP Log File

By default, log files can be accessed only by the user who configures the tracing operation. You can enable all users to read the log file and you can explicitly set the default behavior of the log file.

To specify that all users can read the log file, configure the log file to be world-readable. DHCP local server and DHCP relay agent both support the **world-readable** option for the **traceoptions** statement and the **interface-traceoptions** statement.

```
[edit system services dhcp-local-server traceoptions]
user@host# set file filename world-readable
```

To explicitly set the default behavior, in which the log file can only be read by the user who configured tracing, configure the log file to be no-world-readable. DHCP local server and DHCP relay agent both support the **no-world-readable** option for the **traceoptions** statement and the **interface-traceoptions** statement.

```
[edit system services dhcp-local-server traceoptions]
user@host# set file filename no-world-readable
```

Configuring a Regular Expression for Extended DHCP Lines to Be Logged

By default, the trace operation output includes all lines relevant to the logged events. You can refine the output by including regular expressions that will be matched.

To configure regular expressions to be matched, specify the regular expression. DHCP local server and DHCP relay agent both support the **match** option for the **traceoptions** statement.

```
[edit system services dhcp-local-server traceoptions]
user@host# set file filename match regular-expression
```

Configuring the Extended DHCP Tracing Flags

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. All flags are available for global tracing operations. The Interface-Specific Tracing column shows the subset of flags that you can use for per-interface tracing.

Flag	Description	Interface-Specific Tracing
all	Trace all events	No
auth	Trace authentication events	No
database	Trace database events	No
dhcpv6-general	Trace miscellaneous DHCPv6 events	No
dhcpv6-io	Trace I/O operations for DHCPv6	No

Flag	Description	Interface-Specific Tracing
dhcpv6-packet	Trace DHCPv6 packet decoding operations	Yes
dhcpv6-packet-option	Trace DHCPv6 option decoding operations	Yes
dhcpv6-rpd	Trace routing protocol process events for DHCPv6	No
dhcpv6-session-db	Trace session database operations for DHCPv6	No
dhcpv6-state	Trace changes in state for DHCPv6 operations	Yes
fwd	Trace firewall process events	No
general	Trace miscellaneous events	No
ha	Trace high availability-related events	No
interface	Trace interface operations	No
io	Trace I/O operations	No
packet	Trace packet decoding operations	Yes
packet-option	Trace DHCP option decoding operations	Yes
performance	Trace performance measurement operations	No
profile	Trace profile operations	No
rpd	Trace routing protocol process events	No
rtsock	Trace routing socket operations	No
session-db	Trace session database events	No
state	Trace changes in state	Yes
statistics	Trace baseline statistics	No
ui	Trace user interface operations	No

To configure the flags for the events to be logged, specify the flags. DHCP local server and DHCP relay agent both support the **flag** option for the **traceoptions** statement and the **interface-traceoptions** statement.

- For global tracing operations

  ```
  [edit system services dhcp-local-server traceoptions]
  user@host# set flag flag
  ```

- For per-interface tracing operations

  ```
  [edit system services dhcp-local-server interface-traceoptions]
  user@host# set flag flag
  ```

  For additional information on configuring per-interface tracing options, see "Tracing Extended DHCP Operations for Specific Interfaces" on page 127.

Tracing Extended DHCP Operations for Specific Interfaces

In addition to the global DHCP tracing operations, subscriber management enables you to trace extended DHCP operations for a specific interface or for a range of interfaces.

Configuring per-interface tracing is a two-step procedure. In the first step, you specify the tracing options that you want to use, such as file information and flags. In the second step, you enable the tracing operation on the specific interfaces.

To configure per-interface tracing operations:

1. Specify the tracing options you want to use.

   NOTE: Per-interface tracing uses the same default tracing behavior as the global extended DHCP tracing operation. The default behavior is described in "Tracing Extended DHCP Operations" on page 123.

   a. Specify that you want to configure per-interface tracing options.

      - For DHCP local server and DHCPv6 local server:

        ```
        [edit system services dhcp-local-server]
        user@host# edit interface-traceoptions
        ```

      - For DHCP relay agent:

        ```
        [edit forwarding-options dhcp-relay]
        user@host# edit interface-traceoptions
        ```

   b. (Optional) Specify the tracing file options.

      - Configure the name for the file used for the trace output.

        See "Configuring the Extended DHCP Log Filename" on page 124.

      - Configure the number and size of the log files.

        See "Configuring the Number and Size of Extended DHCP Log Files" on page 124.

      - Configure access to the log file.

See “Configuring Access to the Extended DHCP Log File” on page 125.

- Configure a regular expression to filter logging events.

  See “Configuring a Regular Expression for Extended DHCP Lines to Be Logged” on page 125.

c. (Optional) Specify tracing flag options.

   See “Configuring the Extended DHCP Tracing Flags” on page 125.

2. Enable tracing on an interface or interface range.

   The following examples show a DHCP local server configuration. You can also use the **trace** statement at the **[edit forwarding-options dhcp-relay]** hierarchy level and at the **[edit system services dhcp-local-server dhcpv6]** hierarchy level.

   - Enable tracing on a specific interface.

     ```
     [edit system services dhcp-local-server]
     user@host# set group group-name interface interface-name trace
     ```

   - Enable tracing on a range of interfaces.

     ```
     [edit system services dhcp-local-server]
     user@host# set group group-name interface interface-name upto interface
       interface-name trace
     ```

CHAPTER 11

Configuring Dynamic Access and Access-Internal Routes for DHCP Subscriber Management

Access and Access-Internal Routes for Subscriber Management

The DHCP and PPP applications on a video services router uses both access routes and access-internal routes to represent either the end users or the networks behind the attached router. An access route represents a network behind an attached video services router, and is set to a preference of 13. An access-internal route is a **/32** route that represents a directly attached end user, and is set to a preference of 12.

You can dynamically configure IPv4 access routes using values specified in Framed-Route attribute [22]. Configuring support for access-internal variables is optional, but it ensures that if the next-hop value is missing in the Framed-Routes attribute [22], values from the access-internal variables are used instead.

You can dynamically configure IPv6 access routes using values specified in Framed-IPv6-Route attribute [99].

Related Documentation

- Configuring Dynamic Access Routes for Subscriber Management on page 186
- Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 187
- Configuring Dynamic Access-Internal Routes for PPP Subscriber Management on page 202
- RADIUS IETF Attributes Supported by the AAA Service Framework on page 39

Configuring Dynamic Access Routes for Subscriber Management

You can dynamically configure access routes for DHCP and PPP subscribers based on the values specified in the following RADIUS attributes:

- For IPv4 access routes, use the variable, **$junos-framed-route-ip-address-prefix**. The route prefix variable is dynamically replaced with the value in Framed-Route RADIUS attribute [22].
- For IPv6 access routes, use the variable, **$junos-framed-route-ipv6-address-prefix**. The variable is dynamically replaced with the value in Framed-IPv6-Route RADIUS attribute [99].

To dynamically configure access routes:

1. Configure the route prefix for the access route as a variable.

   For IPv4:

   ```
   [edit dynamic-profiles profile-name routing-options]
   user@host# edit access route $junos-framed-route-ip-address-prefix
   ```

   For IPv6:

   ```
   [edit dynamic-profiles profile-name routing-options]
   user@host# edit access route $junos-framed-route-ipv6-address-prefix
   ```

2. Configure the next-hop address as a variable.

   For IPv4:

   ```
   [edit dynamic-profiles profile-name routing-options access route
     "$junos-framed-route-ip-address-prefix"]
   user@host# set next-hop $junos-framed-route-nexthop
   ```

   For IPv6:

   ```
   [edit dynamic-profiles profile-name routing-options access route
     "$junos-framed-route-ipv6-address-prefix"]
   user@host# set next-hop $junos-framed-route-ipv6-nexthop
   ```

3. Configure the metric as a variable (IPv4 only).

   ```
   [edit dynamic-profiles profile-name routing-options access route
     "$junos-framed-route-ip-address-prefix"]
   user@host# set metric $junos-framed-route-cost
   ```

4. Configure the preference as a variable (IPv4 only).

   ```
   [edit dynamic-profiles profile-name routing-options access route
     "$junos-framed-route-ip-address-prefix"]
   user@host# set preference $junos-framed-route-distance
   ```

5. Configure the tag as a variable (IPv4 only).

   ```
   [edit dynamic-profiles profile-name routing-options access route
     "$junos-framed-route-ip-address-prefix"]
   user@host# set tag $junos-framed-route-tag
   ```

Related Documentation

- Access and Access-Internal Routes for Subscriber Management on page 185
- RADIUS IETF Attributes Supported by the AAA Service Framework on page 39
- Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 187
- Configuring Dynamic Access-Internal Routes for PPP Subscriber Management on page 202
- Verifying the Configuration of Access and Access-Internal Routes for Subscriber Management on page 188

Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management

You can dynamically configure access-internal routes. Configuring support for access-internal variables is optional, but it ensures that if the next-hop value is missing in the Framed-Routes Attribute [22], values from the access-internal variables are used instead.

DHCP subscriber interfaces require the qualified-next-hop to identify the interface and the MAC address.

To dynamically configure access-internal routes:

1. Specify that you want to configure the access-internal route.

   user@host# **edit dynamic-profiles *profile-name* routing-options**

2. Configure the IP address and the qualified next-hop address as variables.

   [edit dynamic-profiles *profile-name* routing-options]
   user@host# **edit access-internal route $junos-subscriber-ip-address qualified-next-hop $junos-interface-name**

   NOTE: Prior to Junos OS Release 10.0, the variable used for qualified-next-hop was $junos-underlying-interface. It is now $junos-interface-name.

3. Configure the MAC address for the qualified next-hop as a variable.

   [edit dynamic-profiles *profile-name* routing-options access-internal route $junos-subscriber-ip-address qualified-next-hop $junos-underlying-interface]
   user@host# **set mac-address $junos-subscriber-mac-address**

Related Documentation

- Access and Access-Internal Routes for Subscriber Management on page 185
- Configuring Dynamic Access Routes for Subscriber Management on page 186
- Verifying the Configuration of Access and Access-Internal Routes for Subscriber Management on page 188

Verifying the Configuration of Access and Access-Internal Routes for Subscriber Management

Purpose View configuration information for access routes and access-internal routes on DHCP and PPP subscribers.

Action

- To display extensive information about access routes and access-internal routes:

  user@host>**show route extensive**

- To display the configuration for access routes:

  user@host>**show route protocol access**

- To display the configuration for access-internal routes:

  user@host> **show route protocol access-internal**

Related Documentation

- Configuring Dynamic Access Routes for Subscriber Management on page 186
- Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 187
- Configuring Dynamic Access-Internal Routes for PPP Subscriber Management on page 202

CHAPTER 12

DHCP Relay Agent Examples

Example: Minimum DHCP Relay Agent Configuration

This example shows the minimum configuration you need to use the extended DHCP relay agent on the router:

```
[edit forwarding-options]
dhcp-relay {
   server-group {
      test 10.0.2.1;
   }
   active-server-group test;
   group all {
      interface fe-0/0/2.0;
   }
}
```

This example creates a server group and an active server group named **test** with IP address 10.0.2.1. The DHCP relay agent configuration is applied to a group named **all**. Within this group, the DHCP relay agent is enabled on interface fe-0/0/2.0.

Related Documentation

- Extended DHCP Relay Agent Overview on page 136

Example: DHCP Relay Agent Configuration with Multiple Clients and Servers

This example shows an extended DHCP relay agent configuration for a network that includes multiple DHCP clients and DHCP servers. Additional details follow the example.

```
[edit forwarding-options]
dhcp-relay {
   server-group {
      sp-1 {
         10.0.2.1;
```

```
            10.0.2.2;
        }
        sp-2 {
            10.33.2.1;
            10.33.2.2;
            10.33.2.3;
        }
    }
    active-server-group sp-1;
    overrides layer2-unicast-replies;
    group clients_a {
        relay-option-82 circuit-id;
        interface fe-1/0/1.1;
        interface fe-1/0/1.2;
        interface fe-1/0/1.3;
    }
    group clients_b {
        relay-option-82 {
            circuit-id {
                prefix routing-instance-name;
            }
        }
        interface fe-1/0/1.4;
        interface fe-1/0/1.5;
        interface fe-1/0/1.6;
    }
    group eth_dslam_relay {
        active-server-group sp-2;
        overrides {
            trust-option-82;
            layer2-unicast-replies;
        }
        interface fe-1/0/1.7;
        interface fe-1/0/1.8;
        interface fe-1/0/1.9;
    }
}
```

This example creates two server-groups: **sp-1**, which includes DHCP server addresses 10.0.2.1 and 10.0.2.2, and **sp-2**, which includes DHCP server addresses 10.33.2.1, 10.33.2.2, and 10.33.2.3. The active server group to which the DHCP relay agent configuration applies is **sp-1**. A global override is set that causes the DHCP relay agent to use Layer 2 unicast transmission to send DHCP reply packets from the DHCP server to DHCP clients during the discovery process.

The example also creates three groups of subscribers and their associated Fast Ethernet interfaces: **clients_a**, **clients_b**, and **eth_dslam_relay**. These groups are configured to meet different needs, as follows:

- The **clients_a** and **clients_b** groups consist of basic subscribers. The service provider for these groups inserts option 82 information in the DHCP packets that are destined for the DHCP server.
- The subscribers in **eth_dslam_relay** are connected to an Ethernet digital subscriber line access multiplexer (DSLAM) that functions as a Layer 2 DHCP relay agent. The active

server group for **eth_dslam_relay** is **sp-2**. Overrides are set for the **eth_dslam_relay** group that enable the DHCP relay agent to trust option 82 information and to use Layer 2 unicast transmission to send DHCP reply packets to DHCP clients during discovery.

Related Documentation

- Extended DHCP Relay Agent Overview on page 136

Example: Configuring DHCP Snooping Support for DHCP Relay Agent

This example shows how to configure DHCP snooping support for DHCP relay agent.

Requirements

- Configure DHCP relay agent. See "Extended DHCP Relay Agent Overview" on page 136.

Overview

In this example, you configure DHCP snooping support for DHCP relay agent by completing the following operations:

- Override the default DHCP snooping configuration and enable DHCP snooping support for the interfaces in group **frankfurt**.
- Configure DHCP relay agent to forward snooped packets to only configured interfaces.

NOTE: By default, DHCP snooping is enabled globally in Junos OS Releases 10.0 and earlier and disabled globally in Junos OS Releases 10.1 and later.

Configuration

Step-by-Step Procedure

To configure DHCP relay support for DHCP snooping:

1. Specify that you want to configure DHCP relay agent.

   ```
   [edit]
   user@host# edit forwarding-options dhcp-relay
   ```

2. Specify the named group of interfaces on which DHCP snooping is supported.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit group frankfurt
   ```

3. Specify the interfaces that you want to include in the group. DHCP relay agent considers these as the configured interfaces when determining whether to forward or drop traffic.

   ```
   [edit forwarding-options dhcp-relay group frankfurt]
   user@host# set interface fe-1/0/1.3 upto fe-1/0/1.9
   ```

4. Specify that you want to override the default configuration for the group.

   ```
   [edit forwarding-options dhcp-relay group frankfurt]
   user@host# edit overrides
   ```

5. Enable DHCP snooping support for the group.

   ```
   [edit forwarding-options dhcp-relay group frankfurt overrides]
   user@host# set allow-snooped-clients
   ```

6. Return to the **[edit forwarding-options dhcp-relay]** hierarchy level to configure the forwarding action and specify that DHCP relay agent forward snooped packets on only configured interfaces:

   ```
   [edit forwarding-options dhcp-relay group frankfurt overrides]
   user@host# up 2
   ```

7. Enable DHCP snooped packet forwarding for DHCP relay agent.

   ```
   [edit forwarding-options dhcp-relay]
   user@host# edit forward-snooped-clients
   ```

8. Specify that snooped packets are forwarded on only configured interfaces (the interfaces in group **frankfurt**).

   ```
   [edit forwarding-options dhcp-relay forward-snooped-clients]
   user@host# set configured-interfaces
   ```

Results From configuration mode, confirm your configuration by entering the **show forwarding-options** command. If the output does not display the intended configuration, repeat the instructions in this example to correct it. The following output also shows a range of configured interfaces in group frankfurt.

```
[edit]
regress@montag# show forwarding-options
dhcp-relay {
  forward-snooped-clients configured-interfaces;
  group frankfurt {
    overrides {
      allow-snooped-clients;
    }
    interface fe-1/0/1.3 {
      upto fe-1/0/1.9;
    }
  }
}
```

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

Related Documentation

- Managing DHCP Snooping Support on page 156
- Configuring DHCP Snooping for DHCP Relay Agent on page 157

Example: Using Option 60 Strings to Forward DHCP Client Traffic

This example extended DHCP relay agent configuration shows how to use the option 60 vendor-specific information in DHCP client packets to forward client traffic to specific DHCP servers. A more detailed explanation follows the example.

```
[edit forwarding-options]
dhcp-relay {
    server-group {
        sp-1 {
            10.0.2.1;
        }
        sp-2 {
            10.33.2.1;
        }
        sp-3 {
            10.22.2.1;
        }
        sp-4 {
            10.10.2.1;
        }
    }
    active-server-group sp-1;
    relay-option-60 {
        vendor-option {
            equals {
                ascii motorola {
                    relay-server-group sp-2;
                }
            }
            starts-with {
                hexadecimal ff {
                    relay-server-group sp-3;
                }
            }
            default-relay-server-group sp-4;
        }
    }
    group all {
        interface fe-0/0/2.0;
    }
}
```

This example defines the following actions for DHCP client packets containing option 60 information:

- All packets that contain an exact match with the ASCII string “motorola” are relayed to server group **sp-2**.
- All packets that start with the hexadecimal string “ff” are relayed to server group **sp-3**.
- All packets that do not either exactly match the ASCII string “motorola” or start with the hexadecimal string “ff” are relayed to the default relay server group, **sp-4**.

DHCP client packets that do not contain option 60 information are relayed to the currently configured active server group, **sp-1**.

Server groups **sp-1**, **sp-2**, **sp-3**, and **sp-4** in this example are configured with the **server-group** statement at the **[edit forwarding-options dhcp-relay]** hierarchy level.

Related Documentation

- Extended DHCP Relay Agent Overview on page 136
- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 169
- **server-group on page 1090**

Example: Using Option 60 Strings to Drop DHCP Client Traffic

This example extended DHCP relay agent configuration shows how to use the option 60 vendor-specific information in DHCP client packets to drop client traffic. Specifying that certain DHCP client packets be dropped can be useful when DHCP clients request services that are invalid or no longer supported.

```
[edit forwarding-options]
dhcp-relay {
   server-group {
      sp-1 {
         10.0.2.1;
      }
   }
   active-server-group sp-1;
   relay-option-60 {
      vendor-option {
         drop;
      }
   }
   group all {
      interface fe-0/0/2.0;
   }
}
```

In this example, all DHCP client packets containing option 60 information are discarded (dropped), and all packets that do not contain option 60 information are relayed to the currently configured active server group, **sp-1**.

Related Documentation

- Extended DHCP Relay Agent Overview on page 136
- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 169

PART 5

PPP for Subscriber Access

CHAPTER 13

Dynamic Profiles for PPP Overview

Dynamic Profiles for PPP Subscriber Interfaces Overview

Subscriber management PPP support enables you to create and attach dynamic profiles for PPP subscriber interfaces. When the PPP subscriber logs in, the router instantiates the specified dynamic profile and then applies the attributes defined in the profile to the interface.

Dynamic profiles are used for both static and dynamic PPP interfaces. For static PPP interfaces, you use the CLI to attach dynamic profiles, which specify PPP options. For dynamic PPP interfaces. the dynamic profile creates the interface, including the PPP options.

NOTE: Dynamically created interfaces are supported only on PPPoE interfaces.

Unlike traditional PPP support, subscriber management does not allow bi-directional PPP authentication—authentication is performed only by the router, never by the remote peer. The router's AAA process manages authentication and address assignment for subscriber management. When you configure PPP options for a dynamic profile, you can configure either CHAP or PAP authentication, but you do not configure any additional options under either the CHAP or PAP stanza. Also, other PPP options, which are either commonly used or mandatory for a traditional PPP interface configuration, are not supported in subscriber management dynamic profiles.

Related Documentation

- Configuring Dynamic Authentication for PPP Subscribers on page 199
- Attaching Dynamic Profiles to Static PPP Subscriber Interfaces on page 203
- Verifying and Managing PPP Configuration for Subscriber Management on page 203
- Example: Minimum PPPoE Dynamic Profile on page 361

CHAPTER 14

Configuring PPP for Subscriber Access

Configuring Dynamic Authentication for PPP Subscribers

You can configure a dynamic profile that includes PPP authentication that enables PPP clients to dynamically access the network. You can specify either CHAP or PAP authentication.

For dynamic interfaces, the router supports unidirectional authentication only—the router always functions as the authenticator. When you configure PPP authentication in a dynamic profile, the **pap** and **chap** statements do not support any additional configuration options, including the **passive** statement.

NOTE: Dynamic profiles for PPP subscribers are supported only on PPPoE interfaces.

To configure authentication in a dynamic profile for PPP subscriber interfaces:

1. Name the dynamic profile.

   ```
   [edit]
   user@host# edit dynamic-profiles vod-profile-25
   ```

2. Configure the interfaces and unit for the dynamic profile. Use **pp0** for the interface type and the Junos predefined variable for the unit.

   ```
   [edit dynamic-profiles vod-profile-25]
   user@host# edit interfaces pp0 unit $junos-interface-unit
   ```

3. Configure PPP options.

   ```
   [edit dynamic-profiles vod-profile-25 interfaces pp0 unit "$junos-interface-unit"]
   user@host# edit ppp-options
   ```

4. Specify the authentication protocol used in the dynamic profile. You can configure either CHAP or PAP. There are no additional options for either authentication protocol.

   ```
   [edit dynamic-profiles vod-profile-25 interfaces pp0 unit "$junos-interface-unit"
     ppp-options]
   user@host# set chap
   ```

Related Documentation

- Dynamic Profiles for PPP Subscriber Interfaces Overview on page 197
- Attaching Dynamic Profiles to Static PPP Subscriber Interfaces on page 203
- Dynamic Profiles Overview on page 325
- Configuring a Basic Dynamic Profile on page 349
- Example: Minimum PPPoE Dynamic Profile on page 361
- Verifying and Managing PPP Configuration for Subscriber Management on page 203

Access and Access-Internal Routes for Subscriber Management

The DHCP and PPP applications on a video services router uses both access routes and access-internal routes to represent either the end users or the networks behind the attached router. An access route represents a network behind an attached video services router, and is set to a preference of 13. An access-internal route is a **/32** route that represents a directly attached end user, and is set to a preference of 12.

You can dynamically configure IPv4 access routes using values specified in Framed-Route attribute [22]. Configuring support for access-internal variables is optional, but it ensures that if the next-hop value is missing in the Framed-Routes attribute [22], values from the access-internal variables are used instead.

You can dynamically configure IPv6 access routes using values specified in Framed-IPv6-Route attribute [99].

Related Documentation

- Configuring Dynamic Access Routes for Subscriber Management on page 186
- Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 187
- Configuring Dynamic Access-Internal Routes for PPP Subscriber Management on page 202
- RADIUS IETF Attributes Supported by the AAA Service Framework on page 39

Configuring Dynamic Access Routes for Subscriber Management

You can dynamically configure access routes for DHCP and PPP subscribers based on the values specified in the following RADIUS attributes:

- For IPv4 access routes, use the variable, **$junos-framed-route-ip-address-prefix**. The route prefix variable is dynamically replaced with the value in Framed-Route RADIUS attribute [22].
- For IPv6 access routes, use the variable, **$junos-framed-route-ipv6-address-prefix**. The variable is dynamically replaced with the value in Framed-IPv6-Route RADIUS attribute [99].

To dynamically configure access routes:

1. Configure the route prefix for the access route as a variable.

   For IPv4:

   ```
   [edit dynamic-profiles profile-name routing-options]
   user@host# edit access route $junos-framed-route-ip-address-prefix
   ```

   For IPv6:

   ```
   [edit dynamic-profiles profile-name routing-options]
   user@host# edit access route $junos-framed-route-ipv6-address-prefix
   ```

2. Configure the next-hop address as a variable.

   For IPv4:

   ```
   [edit dynamic-profiles profile-name routing-options access route
     "$junos-framed-route-ip-address-prefix"]
   user@host# set next-hop $junos-framed-route-nexthop
   ```

   For IPv6:

   ```
   [edit dynamic-profiles profile-name routing-options access route
     "$junos-framed-route-ipv6-address-prefix"]
   user@host# set next-hop $junos-framed-route-ipv6-nexthop
   ```

3. Configure the metric as a variable (IPv4 only).

   ```
   [edit dynamic-profiles profile-name routing-options access route
     "$junos-framed-route-ip-address-prefix"]
   user@host# set metric $junos-framed-route-cost
   ```

4. Configure the preference as a variable (IPv4 only).

   ```
   [edit dynamic-profiles profile-name routing-options access route
     "$junos-framed-route-ip-address-prefix"]
   user@host# set preference $junos-framed-route-distance
   ```

5. Configure the tag as a variable (IPv4 only).

   ```
   [edit dynamic-profiles profile-name routing-options access route
     "$junos-framed-route-ip-address-prefix"]
   user@host# set tag $junos-framed-route-tag
   ```

Related Documentation

- Access and Access-Internal Routes for Subscriber Management on page 185
- RADIUS IETF Attributes Supported by the AAA Service Framework on page 39
- Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 187
- Configuring Dynamic Access-Internal Routes for PPP Subscriber Management on page 202
- Verifying the Configuration of Access and Access-Internal Routes for Subscriber Management on page 188

Configuring Dynamic Access-Internal Routes for PPP Subscriber Management

You can dynamically configure access-internal routes for PPP subscribers. Configuring support for access-internal variables is optional, but it ensures that if the next-hop value is missing in the Framed-Routes Attribute [22], values from the access-internal variables are used instead.

For PPP subscriber interfaces, you do not need to specify the MAC address for access-internal routes.

To dynamically configure access-internal routes for PPP:

1. Specify that you want to configure the access-internal route.

   user@host# **edit dynamic-profiles *profile-name* routing-options**

2. Specify the IP address as a variable.

   [edit dynamic-profiles *profile-name* routing-options]
   user@host# **edit access-internal route $junos-subscriber-ip-address**

3. Specify the qualified-next-hop as a variable.

   [edit dynamic-profiles *profile-name* routing-options access-internal route $junos-subscriber-ip-address]
   user@host# **set qualified-next-hop $junos-interface-name**

Related Documentation

- Access and Access-Internal Routes for Subscriber Management on page 185
- Configuring Dynamic Access Routes for Subscriber Management on page 186
- Verifying the Configuration of Access and Access-Internal Routes for Subscriber Management on page 188

Attaching Dynamic Profiles to Static PPP Subscriber Interfaces

You can attach a dynamic profile to a static PPP subscriber interface. When a PPP subscriber logs in, the specified dynamic profile is instantiated and the services defined in the profile are applied to the interface.

To attach a dynamic profile to a static PPP subscriber interface:

1. Specify that you want to configure PPP options.

   ```
   [edit interfaces pp0 unit 0]
   user@host# edit ppp-options
   ```

2. Specify the dynamic profile you want to associate with the interface.

   ```
   [edit interfaces pp0 unit 0 ppp-options
   user@host# set dynamic-profile vod-profile-50
   ```

Related Documentation

- Dynamic Profiles for PPP Subscriber Interfaces Overview on page 197
- Configuring Dynamic Authentication for PPP Subscribers on page 199
- Dynamic Profiles Overview on page 325
- Configuring a Basic Dynamic Profile on page 349
- Example: Minimum PPPoE Dynamic Profile on page 361
- Verifying and Managing PPP Configuration for Subscriber Management on page 203

Verifying and Managing PPP Configuration for Subscriber Management

Purpose View or clear information about PPP configuration for subscriber management.

Action

- To display information about PPP interfaces:

  ```
  user@host> show ppp interface
  ```

- To display PPP statistics information:

  ```
  user@host> show ppp statistics
  ```

- To display PPP session summary information:

  ```
  user@host> show ppp summary
  ```

Related Documentation

- Dynamic Profiles for PPP Subscriber Interfaces Overview on page 197
- For more information, see the *Junos OS System Basics and Services Command Reference*

Verifying the Configuration of Access and Access-Internal Routes for Subscriber Management

Purpose View configuration information for access routes and access-internal routes on DHCP and PPP subscribers.

Action

- To display extensive information about access routes and access-internal routes:

  user@host>**show route extensive**

- To display the configuration for access routes:

  user@host>**show route protocol access**

- To display the configuration for access-internal routes:

  user@host> **show route protocol access-internal**

Related Documentation

- Configuring Dynamic Access Routes for Subscriber Management on page 186
- Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 187
- Configuring Dynamic Access-Internal Routes for PPP Subscriber Management on page 202

CHAPTER 15

Configuring Subscriber Services for MLPPP Interfaces

Dynamic PPP Subscriber Services for Static MLPPP Interfaces

Dynamic subscriber services are supported for MLPPP bundle interfaces, with certain interface and hardware restrictions. See “Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces” on page 206. Multiclass MLPPP (MCML) enables the relative prioritization of up to eight classes of traffic over an MLPPP bundle, but only on link services intelligent queuing (IQ) (LSQ) interfaces.

RADIUS previously supported only authentication for MLPPP. Address management, service deactivation, dynamic selection of subscriber properties based on RADIUS user ID are now also supported.

RADIUS can dynamically allocate IPv4 addresses for MLPPP connections. When the first subscriber logs in, an address is allocated. The same address is allocated to all links in a bundle. Any other address provided for any of the links is ignored. The IP address is released for re-allocation when the last member link in a bundle logs out. Similar to the address allocation, the services configured for the first subscriber to log in are configured for all subsequent subscribers in the bundle.

The Acct-Multi-Session-Id [50] attribute enables RADIUS to link multiple related sessions into a single log file. RADIUS uses the session database (SDB) bundle session ID for the value of Acct-Multi-Session-Id. This bundle ID enables RADIUS to initiate a disconnect for an entire bundle. By tracking the member link sessions, RADIUS is also able to disconnect the individual member links in a bundle.

The Acct-Link-Count [51] attribute records the number of links present in a multilink session at the time the accounting record is generated.

Related Documentation

- For hardware requirements, see Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces on page 206
- Configuring PPP Subscriber Services for MLPPP Bundles on page 206

Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces

PPP subscriber services are supported for MLPPP bundle interfaces. These services require the following hardware:

- M120 router or M320 router
- Channelized DS3/E3 Enhanced IP PIC (PB-4CHDS3-E3-IQE-BNC) to support MLPPP subscriber access
- An Adaptive Services PIC or Multiservices PIC to support subscriber services on LSQ MLPPP bundle interfaces

Subscriber services are not supported for single-link PPP interfaces with this hardware.

Configuring PPP Subscriber Services for MLPPP Bundles

You can configure PPP subscriber services for static LSQ MLPPP bundle interfaces.

To configure PPP subscriber services for static LSQ MLPPP bundle interfaces:

1. Enable PPP subscriber services for the interfaces.

   See “Enabling PPP Subscriber Services for Static Non-Ethernet Interfaces” on page 206.

2. Attach a dynamic profile to the MLPPP bundle interface.

   See “Attaching Dynamic Profiles to MLPPP Bundles” on page 207.

Related Documentation

- For hardware requirements, see Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces on page 206
- Example: Minimum MLPPP Dynamic Profile on page 360
- Example: Configuring CoS on Static LSQ MLPPP Bundle Interfaces on page 425

Enabling PPP Subscriber Services for Static Non-Ethernet Interfaces

You can enable PPP subscriber services for certain non-Ethernet interface types on particular associated PICs. Supported interfaces are listed in “Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces” on page 206.

To enable PPP subscriber services on supported non-Ethernet interfaces:

- Configure PPP subscriber services.

```
[edit chassis]
user@host# set ppp-subscriber-services enable
```

To disable PPP subscriber services on supported non-Ethernet interfaces:

- Disable PPP subscriber services.

```
[edit chassis]
user@host# set ppp-subscriber-services disable
```

Related Documentation

- For hardware requirements, see Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces on page 206
- Configuring PPP Subscriber Services for MLPPP Bundles on page 206

Attaching Dynamic Profiles to MLPPP Bundles

You can attach a dynamic profile to a static MLPPP bundle interface. When a PPP subscriber logs in on a member link, the specified dynamic profile is instantiated and the services defined in the profile are applied to the LSQ bundle interface.

To attach a dynamic profile to a static LSQ MLPPP bundle interface:

1. Specify that you want to configure PPP options.

```
[edit interfaces lsq-3/3/0 unit 0]
user@host# edit ppp-options
```

2. Specify the dynamic profile you want to associate with the interface.

```
[edit interfaces lsq-3/3/0 unit 0 ppp-options]
user@host# set dynamic-profile vod-profile-50
```

Related Documentation

- For hardware requirements, see Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces on page 206
- Configuring PPP Subscriber Services for MLPPP Bundles on page 206
- Dynamic Profiles for PPP Subscriber Interfaces Overview on page 197
- Dynamic Profiles Overview on page 325
- Configuring a Basic Dynamic Profile on page 349
- Configuring PPP Subscriber Services for MLPPP Bundles on page 206
- Example: Minimum MLPPP Dynamic Profile on page 360
- Example: Configuring CoS on Static LSQ MLPPP Bundle Interfaces on page 425

PART 6

L2TP for Subscriber Access

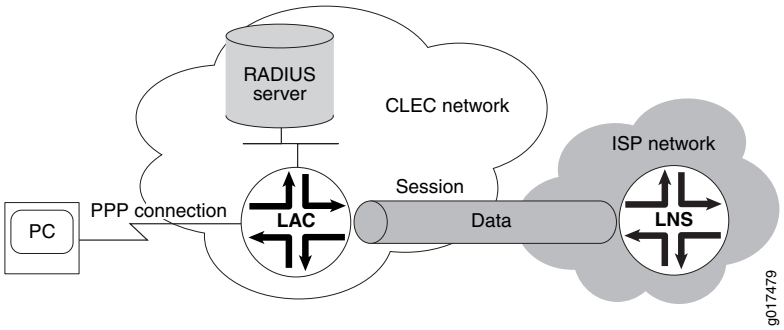
CHAPTER 16

L2TP for Subscriber Access Overview

L2TP for Subscriber Access Overview

The Layer 2 Tunneling Protocol (L2TP) is a client-server protocol that allows the Point-to-Point Protocol (PPP) to be tunneled across a network. L2TP encapsulates Layer 2 packets, such as PPP, for transmission across a network. An L2TP access concentrator (LAC), configured on an access device, receives packets from a remote client and forwards them to an L2TP network server (LNS) on a remote network. Figure 4 on page 211 shows a simple L2TP topology.

Figure 4: Simple L2TP Topology

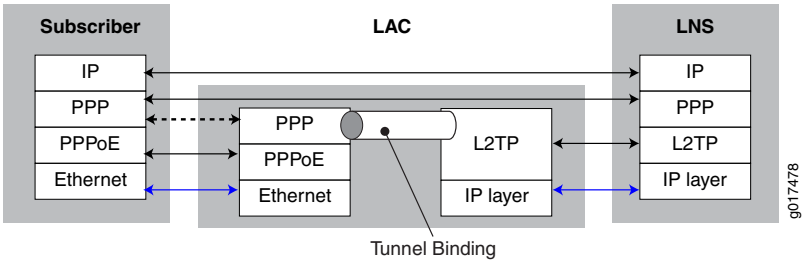


L2TP separates the termination of access technologies, such as cable or xDSL, from the termination of PPP and subsequent access to a network. This separation enables public ISPs to outsource their access technologies to competitive local exchange carriers (CLECs). L2TP provides ISPs the capability to supply VPN service; private enterprises can reduce or avoid investment in access technologies for remote workers.

You can configure your router to act as an LAC in PPP pass-through mode in which the LAC receives packets from a remote client and then forwards them at Layer 2 directly to the LNS. The PPP session is terminated on the LNS. This LAC implementation supports only Point-to-Point Protocol over Ethernet (PPPoE) subscribers over dynamic or static

logical interfaces. Figure 5 on page 212 shows the protocol layer stacking for an L2TP pass-through connection.

Figure 5: Protocol Stacking for L2TP Subscribers in Pass-Through Mode



NOTE: On MX Series routers, only the LAC function is supported in this release. The LNS function is supported on certain M Series routers. For more information about the L2TP implementation on M Series routers, see the *Services Interfaces Configuration Guide*.

The router creates tunnels dynamically based on AAA authentication parameters and transmits L2TP packets to the LNS by means of the IP/User Datagram Protocol (UDP). Traffic travels in an L2TP *session*; a tunnel is an aggregation of one or more sessions. You can also provision a domain map that is used by AAA to determine whether to tunnel or terminate the PPPoE subscriber.

The characteristics of the tunnel can originate either from a tunnel profile that you configure or from RADIUS tunnel attributes and vendor-specific attributes (VSAs). You can include a tunnel profile in a domain map, which applies the tunnel profile before RADIUS authentication takes place. You can use RADIUS standard attributes and VSAs to override any or all characteristics configured by the tunnel profile in a domain map. Alternatively, RADIUS can itself apply a tunnel profile when the RADIUS Tunnel-Group VSA [26-64] is specified in the RADIUS login.

The LAC supports RADIUS-initiated mirroring, which creates secure policies based on certain RADIUS VSAs, and uses RADIUS attributes to identify a subscriber whose traffic is to be mirrored.

Related Documentation

- RADIUS IETF Attributes Supported by the AAA Service Framework on page 39
- Juniper Networks VSAs Supported by the AAA Service Framework on page 45
- Configuring a Tunnel Profile for Subscriber Access on page 219
- Domain Mapping Overview on page 65
- Subscriber Secure Policy and L2TP LAC Subscribers on page 559

L2TP Terminology

Table 30 on page 213 describes the basic terms for L2TP.

Table 30: L2TP Terms

Term	Description
AVP	Attribute value pair (AVP)—Combination of a unique attribute—represented by an integer—and a value containing the actual value identified by the attribute.
Call	A connection (or attempted connection) between a remote system and the LAC.
LAC	L2TP access concentrator (LAC)—A node that acts as one side of an L2TP tunnel endpoint and is a peer to the LNS. The LAC sits between an LNS and a remote system and forwards packets to and from each.
LNS	L2TP network server (LNS)—A node that acts as one side of an L2TP tunnel endpoint and is a peer to the LAC. The LNS is the logical termination point of a PPP connection that is being tunneled from the remote system by the LAC.
Peer	In the L2TP context, refers to either the LAC or LNS. The LAC's peer is an LNS, and vice versa.
Proxy authentication	Authentication data from the PPP client that is sent from the LNS as part of a proxy LCP. Data might include attributes such as authentication type, authentication name, and authentication challenge.
Proxy LCP	Link Control Protocol (LCP)—Negotiation that is performed by the LAC on behalf of the LNS. The proxy is sent by the LAC to the LNS containing attributes such as the last configuration attributes sent and received from the client.
Remote system	An end system or router attached to a remote access network, which is either the initiator or recipient of a call.
Session	A logical connection created between the LAC and the LNS when an end-to-end PPP connection is established between a remote system and the LNS. NOTE: There is a one-to-one relationship between established L2TP sessions and their associated PPP connections.
Tunnel	A connection between an LAC-LNS pair consisting of a control connection and 0 or more L2TP sessions.

Implementing L2TP

L2TP is implemented on four levels:

- Source—The local router acting as an LAC
- Destination—The remote router acting as an LNS
- Tunnel—A direct path between the LAC and the LNS
- Session—A PPP connection in a tunnel.

When the router has established destinations, tunnels, and sessions, you can control the L2TP traffic. Making a change to a destination affects all tunnels and sessions to that

destination; making a change to a tunnel affects all sessions in that tunnel. For example, closing a destination closes all tunnels and sessions to that destination.

Sequence of Events on the LAC

The router acting as the LAC creates destinations, tunnels, and sessions dynamically, as follows:

1. The client initiates a PPP connection with the router.
2. The router and the client exchange Link Control Protocol (LCP) packets. The LAC negotiates on behalf of the LNS; this is known as proxy LCP.
3. The LAC authenticates the client on behalf of the LNS; this is known as proxy authentication. By using either a local database related to the domain name or RADIUS authentication, the router determines either to terminate or to tunnel the PPP connection.
4. If the router discovers that it should tunnel the session, it does the following:
   a. Sets up a new destination or selects an existing destination.
   b. Sets up a new tunnel or selects an existing tunnel.

      When a shared secret is configured in either the tunnel profile or the RADIUS attribute Tunnel-Password [69]—depending on which method is used to configure the tunnel—the secret is used to authenticate the tunnel during the establishment phase. The LAC includes the Challenge AVP in the SCCRQ message sent to the LNS. The LNS returns the Challenge Response AVP in the SCCRP message. If the response from the LNS does not match the value expected by the LAC, then tunnel authentication fails and the tunnel is not established.

   c. Opens a new session.
5. The router forwards the results of the LCP negotiations and authentication to the LNS.

A PPP connection now exists between the client and the LNS.

NOTE: The router discards received packets if the size of the variable-length, optional offset pad field in the L2TP header is too large. The router always supports packets that have an offset pad field of up to 16 bytes, and may support larger offset pad fields, depending on other information in the header. This restriction is a possible, although unlikely, cause of excessive discarding of L2TP packets.

Sequence of Events on the LNS

NOTE: The MX Series router does not support LNS in the current release.

A typical router acting as an LNS might be set up as follows:

1. An LAC initiates a tunnel with the router.
2. The router verifies that a tunnel with this LAC is valid: destination configured, hostname and tunnel password correct.
3. The router completes the tunnel setup with the LAC.
4. The LAC sets up a session with the router.
5. The router creates a dynamic PPP interface on top of the session.
6. If they are enabled and present, the router takes the proxy LCP and the proxy authentication data and passes them to PPP.
7. PPP processes the proxy LCP, if it is present, and, if acceptable, places LCP on the router in opened state without renegotiation of LCP.

NOTE: If the proxy LCP is not present or not acceptable, the router negotiates LCP with the peer.

8. PPP processes the proxy authentication data, if present, and passes the data to AAA for verification. (If the data is not present, PPP requests the data from the peer.)
9. The router passes the authentication results to the peer.

LAC Tunnel Selection Overview

L2TP enables you to specify:

- Up to 31 destinations for a domain.
- Up to eight levels of preference. Preference indicates the order in which the router attempts to connect to the destinations specified for a domain. Zero (0) is the highest level of preference.
- Up to 31 destinations for a single preference level.

When the LAC determines that a PPP session should be tunneled, it selects a tunnel from a set of tunnels associated with either the PPP user or the PPP user's domain. The router provides the following methods for selecting tunnels:

- Tunnel selection failover between preference levels (the default behavior)
- Tunnel selection failover within a preference level

- Maximum sessions per tunnel
- Weighted load balancing

Tunnel Selection Failover Between Preference Levels

When a user tries to log in to a domain, in the default method, the router attempts to connect to a destination in that domain by means of the associated tunnel with the highest preference level. If more than one destination is considered reachable by a tunnel in the preference level, the router randomly selects a destination and attempts to contact it through its associated tunnel at that level. If the router is unsuccessful, it marks the destination as unreachable and does not try to connect to that destination for five minutes. The router then moves to the next lower preference level and repeats the process.

For example, suppose that there are three destinations for a domain and a tunnel has been defined for each destination: A, B, and C. All destinations are considered reachable, and the preference levels for the tunnels are assigned as follows:

- A at preference 0
- B at preference 1
- C at preference 2

When a PPP user tries to connect to the domain, the router initially attempts to reach a destination by a tunnel at preference level 0. In this example, that is destination A. If this connection attempt fails, the router excludes destination A for five minutes and goes to the next level (preference 1) to reach a destination for the domain. At level 1, it attempts to connect to destination B. If the second connection attempt also fails, the router excludes destination B in addition to the already excluded destination A. The router goes to the next level (preference 2), and attempts to connect to destination C, the only destination in the domain that is still available. If that attempt also fails, the router has attempted to connect to every tunnel available for the domain. When the exclusion period for destination A expires, the router can attempt again to connect to destination A, and so on.

Although the five-minute timer typically prevents an unreachable destination from being tried until the timer expires, the timer is ignored in some circumstances. For example, If all destinations at a preference level are marked as unreachable when a user tries to log in to a domain, the router chooses and attempts to connect to the destination that failed first and therefore has the shortest time remaining until the timer expires. The key is to understand that the router always chooses a single destination at each level of preference, even if all destinations have recently failed.

If more than one destination for the domain is present at a preference level, the router randomly selects among them. If the router fails to connect to a destination at all preference levels with destinations for the domain, it cycles back to the highest level that still has a destination not excluded by an attempt.

For example, suppose that again there are three destinations for a domain and a tunnel has been defined for each destination: A, B, and C. All destinations are considered reachable, but the tunnels are distributed among the preference levels as follows:

- A and B at preference 0
- C at preference 1

If a PPP user tries to connect to the domain, the router randomly selects between A and B at level 0. Suppose it selects B, but the connection attempt fails. The router excludes destination B for five minutes and goes to the next level (preference 1) to reach a destination for the domain. At level 1, it attempts to connect to destination C. If the second connection attempt also fails, the router excludes destination C in addition to the already excluded destination B. The router cycles back to preference level 0. If destination B is still excluded, it attempts to connect to destination A. If the exclusion period for destination B has expired, then the router once again randomly selects between A and B to attempt a connection.

Tunnel Selection Failover Within a Preference Level

When tunnel selection failover within a preference level is configured, if the router tries to connect to a destination and is unsuccessful, it selects a new destination at the same preference level. If all destinations at a preference level are marked as unreachable, the router does not attempt to connect to a destination at that level. It drops to the next lower preference level to select a destination.

If all destinations at all preference levels are marked as unreachable, the router chooses the destination that failed first and tries to make a connection. If the connection fails, the router rejects the PPP user session without attempting to contact the remote router.

For example, suppose that there are four destinations for a domain and a tunnel has been defined for each destination: A, B, C, and D. All destinations are considered reachable, and the preference levels for the tunnels are assigned as follows:

- A and B at preference 0
- C and D at preference 1

When the router attempts to connect to the domain, suppose it randomly selects tunnel B from preference 0. If it fails to connect to the destination, the router excludes tunnel B for five minutes and attempts to connect to a destination with tunnel A. If this attempt also fails, the router drops to preference level 1. Then suppose the router randomly selects tunnel C. If it also fails to connect to a destination with tunnel C, the router excludes tunnel C for five minutes and attempts to connect with tunnel D. If this connection attempt fails, then the router attempts to use tunnel B again, the original selection. If that attempt fails, the user session is rejected.

Tunnel Selection and Maximum Sessions per Tunnel

When the maximum number of sessions allowed per tunnel is configured, the router takes that setting into consideration during the tunnel selection process. The maximum

number of sessions per tunnel can be configured through a RADIUS Tunnel-Max-Sessions VSA [26-64] or by including the **max-sessions** statement in a tunnel profile.

If a randomly selected tunnel has a current session count equal to its maximum session count, the router does not attempt to connect to a destination with that tunnel. Instead, it selects an alternate tunnel from the set of reachable tunnels at the same preference level. If no additional reachable tunnels exist at the current preference level, the router drops to the next lower preference level to make the selection. This process is consistent, regardless of which fail-over scheme is currently running on the router.

If the maximum number of sessions is not configured for a tunnel, then that tunnel has no upper limit on the number of sessions it can support. By default, the maximum sessions value is 0 (zero), which allows unlimited sessions in the tunnel.

Tunnel Selection with Weighted Load Balancing

The maximum sessions value for a tunnel is used for weighted load balancing to select among multiple tunnels with the same preference level.

The weight of a tunnel is determined by the tunnel's maximum session limit and the maximum session limits of the other tunnels at the same preference level. The tunnel with the largest maximum session value has the largest weight. The tunnel with the next largest maximum session value has the next largest weight, and so on. The tunnel with the smallest maximum session value has the smallest weight.

Related Documentation

- Configuring the L2TP LAC Tunnel Selection Parameters on page 222

CHAPTER 17

Configuring L2TP for Subscriber Access

Configuring an L2TP LAC

To configure an L2TP LAC:

1. Configure a tunnel profile to apply to subscribers.

   See “Configuring a Tunnel Profile for Subscriber Access” on page 219.

2. (Optional) Configure the method used for selecting among multiple tunnels.
   - See “Configuring the L2TP LAC Tunnel Selection Parameters” on page 222.
   - See “Configuring Weighted Load Balancing for LAC Tunnel Sessions” on page 223.
   - See “Configuring LAC Tunnel Selection Failover Within a Preference Level” on page 222.

3. (Optional) Configure the LAC to not send Calling Number AVP 22 to the LNS.

   See “Preventing the LAC From Sending Calling Number AVP 22 to the LNS” on page 223.

4. (Optional) Configure trace options for troubleshooting the configuration.

   See “Tracing L2TP Operations for Subscriber Access” on page 224

Configuring a Tunnel Profile for Subscriber Access

The tunnel profile specifies a set of attributes to characterize the tunnel. The profile can be applied by a domain map or automatically when the tunnel is created.

NOTE: RADIUS attributes and VSAs can override the values you configure in a domain map. In the absence of a domain map, RADIUS can supply all the characteristics of a tunnel. The steps in the following procedure list the corresponding standard RADIUS attribute or VSA that you can configure on your RADIUS server to modify or configure the tunnel profile.

To configure a tunnel definition for a tunnel profile:

1. Specify the tunnel profile for which you are defining a tunnel. (Tunnel-Group [26-64])

   [edit access]
   user@host# **set tunnel-profile** ***profile-name***

2. Specify an identification number for the L2TP control connection for the tunnel.

   [edit access tunnel-profile *profile-name*]
   user@host# **set tunnel** ***tunnel-id***

3. Configure the IP address of the local L2TP tunnel endpoint, the LAC. (Tunnel-Client-Endpoint [66])

   [edit access tunnel-profile *profile-name* tunnel *tunnel-id*]
   user@host# **set source-gateway address** ***client-ip-address***

4. Configure the IP address of the remote L2TP tunnel endpoint, the LNS. (Tunnel-Server-Endpoint [67])

   [edit access tunnel-profile *profile-name* tunnel *tunnel-id*]
   user@host# **set remote-gateway address** ***server-ip-address***

5. (Optional) Configure the preference level for the tunnel. (Tunnel-Preference [83])

   [edit access tunnel-profile *profile-name* tunnel *tunnel-id*]
   user@host# **set preference** ***number***

6. (Optional) Configure the hostname of the local client (LAC). (Tunnel-Client-Auth-Id [90])

   [edit access tunnel-profile *profile-name* tunnel *tunnel-id*]
   user@host# **set source-gateway gateway-name** ***client-name***

7. (Optional) Configure the hostname of the remote server (LNS). (Tunnel-Server-Auth-Id [91])

   [edit access tunnel-profile *profile-name* tunnel *tunnel-id*]
   user@host# **set remote-gatewaygateway-name** ***server-name***

8. (Optional) Specify the medium (network) type for the tunnel. (Tunnel-Medium-Type [65])

   [edit access tunnel-profile *profile-name* tunnel *tunnel-id*]
   user@host# **set medium** ***type***

9. (Optional) Specify the protocol type for the tunnel. (Tunnel-Type [64])

   [edit access tunnel-profile *profile-name* tunnel *tunnel-id*]
   user@host# **set type** ***tunnel-type***

10. (Optional) Configure the assignment ID for the tunnel. (Tunnel-Assignment-Id [82])

[edit access tunnel-profile *profile-name* tunnel *tunnel-id*]
user@host# set identification *name*

11. (Optional) Configure the maximum number of sessions allowed in the tunnel. (Tunnel-Max-Sessions [26-33])

    [edit access tunnel-profile *profile-name* tunnel *tunnel-id*]
    user@host# set max-sessions *number*

12. (Optional) Configure the password for remote server authentication. (Standard RADIUS attribute Tunnel-Password [69] or VSA Tunnel-Password [26-9])

    [edit access tunnel-profile *profile-name* tunnel *tunnel-id*]
    user@host# set secret *password*

13. (Optional) Configure the logical system to use for the tunnel.

    If you configure a logical system, you must also configure a routing instance.

    [edit access tunnel-profile *profile-name* tunnel *tunnel-id*]
    user@host# set logical-system *logical-system-name*

14. (Optional) Configure the routing instance to use for the tunnel. (Tunnel-Virtual-Router [26-8])

    If you configure a routing instance, configuring a logical system is optional.

    [edit access tunnel-profile *profile-name* tunnel *tunnel-id*]
    user@host# set routing-instance *routing-instance-name*

The following example shows a complete configuration for a tunnel profile.

```
tunnel-profile marketing {
  tunnel 1 {
    preference 5;
    remote-gateway {
      address 172.16.98.4;
      gateway-name work;
    }
    source-gateway {
      address 192.168.4.10;
      gateway-name local;
    }
    secret mk5Sn$3k%V;
    logical-system bos-metro-5;
    routing-instance rox-12-32;
    medium ipv4;
    type l2tp;
    identification tunnel_to_work;
    max-sessions 32;
  }
}
```

Related Documentation

- Domain Mapping Overview on page 65

Configuring the L2TP LAC Tunnel Selection Parameters

When the LAC determines that a PPP session should be tunneled, it selects a tunnel from the set of tunnels associated with either the PPP user or the PPP user's domain. You can configure how a tunnel is selected and whether certain information is sent by the LAC to the LNS.

To configure tunnel selection parameters:

1. (Optional) Configure how a tunnel is selected when a connection attempt fails.

   See "Configuring LAC Tunnel Selection Failover Within a Preference Level" on page 222.

2. (Optional) Configure how sessions are load-balanced among tunnels.

   See "Configuring Weighted Load Balancing for LAC Tunnel Sessions" on page 223.

Related Documentation

- LAC Tunnel Selection Overview on page 215

Configuring LAC Tunnel Selection Failover Within a Preference Level

You can configure how LAC tunnel selection continues in the event of a failure to connect. By default, when the router is unable to connect to a destination at a given preference level, it attempts to connect at the next lower level. You can specify that the router instead attempt to connect to another destination at the same level as the failed attempt.

If all destinations at a preference level are marked as unreachable, the router does not attempt to connect to a destination at that level. It drops to the next lower preference level to select a destination.

If all destinations at all preference levels are marked as unreachable, the router chooses the destination that failed first and tries to make a connection. If the connection fails, the router rejects the PPP user session without attempting to contact the remote router.

For example, suppose there are four tunnels for a domain: A, B, C, and D. All tunnels are considered reachable, and the preference levels are assigned as follows:

- A and B at preference 0
- C and D at preference 1

When the router attempts to connect to the domain, suppose it randomly selects tunnel B from preference 0. If it fails to connect to tunnel B, the router excludes tunnel B for five minutes and attempts to connect to tunnel A. If this attempt also fails, the router drops to preference 1. Then suppose the router selects tunnel C. If it also fails to connect to tunnel C, the router excludes tunnel C for five minutes and attempts to connect to tunnel D.

You configure the preference level used for this tunnel selection method in the tunnel profile or the RADIUS Tunnel-Preference [83] attribute.

To enable tunnel selection failover within a preference level:

- Specify failover within preference.

```
[edit services l2tp]
user@host# set fail-over-within-preference
```

Related Documentation

- LAC Tunnel Selection Overview on page 215
- Configuring the L2TP LAC Tunnel Selection Parameters on page 222
- Configuring a Tunnel Profile for Subscriber Access on page 219
- Configuring How RADIUS Attributes Are Used for Subscriber Access on page 30

Configuring Weighted Load Balancing for LAC Tunnel Sessions

You can configure how L2TP LAC sessions are distributed across tunnels. You can specify that the router uses the maximum sessions per tunnel to choose among multiple tunnels that share the same preference level.

The weight of a tunnel is proportional to its maximum session limit and the maximum session limits of the other tunnels at the same preference level. The tunnel with the largest maximum session value has the highest weight. The tunnel with the next larger maximum session value has the next higher weight, and so on. The tunnel with the smallest maximum session value has the lowest weight.

When you configure weighted load balancing, the tunnel with the highest weight in the preference level is selected until the maximum number of sessions for the tunnel is reached. Then the router selects the tunnel with the next higher weight to establish connections until that tunnel's maximum session limit is reached, and so on.

To configure weighted load balancing:

- Specify load balancing.

```
[edit services l2tp]
user@host# set weighted-load-balancing
```

Related Documentation

- LAC Tunnel Selection Overview on page 215
- Configuring the L2TP LAC Tunnel Selection Parameters on page 222

Preventing the LAC From Sending Calling Number AVP 22 to the LNS

Calling Number AVP 22 typically identifies the interface that is connected to the customer in the access network. When RADIUS includes the Calling-Station-Id in the Access-Accept message, that value is used for the Calling Number AVP. Otherwise, the underlying interface (for example, the SVLAN IFL) on which the PPPoE session is established is used for the Calling Number AVP value.

By default, the LAC includes this AVP in the incoming-call request (ICRQ) packets that it sends to the LNS. However, you may wish to hide your network access interface information. To do so, you can configure the tunnel so that the LAC does not send the Calling Number AVP to the LNS.

To disable sending the Calling Number AVP:

- Configure disabling.

```
[edit services l2tp]
user@host# set disable-calling-number-avp
```

Related Documentation

- LAC Tunnel Selection Overview on page 215

Tracing L2TP Operations for Subscriber Access

The Junos OS trace feature tracks L2TP operations and records events in a log file. The error descriptions captured in the log file provide detailed information to help you solve problems.

By default, nothing is traced. When you enable the tracing operation, the default tracing behavior is as follows:

1. Important events are logged in a file called **jl2tpd** located in the **/var/log** directory. You cannot change the directory (**/var/log**) in which trace files are located.
2. When the file **jl2tpd** reaches 128 kilobytes (KB), it is renamed **jl2tpd.0**, then **jl2tpd.1**, and so on, until there are three trace files. Then the oldest trace file (**jl2tpd.2**) is overwritten.

   You can optionally configure the maximum file size to be from 10 KB through 1 gigabyte (GB). You can also specify the number of trace files to be from 2 through 1000. (For more information about how log files are created, see the *Junos OS System Log Messages Reference*.)

By default, only the user who configures the tracing operation can access log files. You can optionally configure read-only access for other users.

The L2TP traceoptions operations are described in the following sections:

- Configuring the L2TP Trace Log Filename on page 224
- Configuring the Number and Size of L2TP Log Files on page 225
- Configuring Access to the L2TP Log File on page 225
- Configuring a Regular Expression for L2TP LAC to Be Logged on page 225
- Configuring the L2TP Tracing Flags on page 226

Configuring the L2TP Trace Log Filename

By default, the name of the file that records trace output for L2TP is **jl2tpd**. You can specify a different name with the **file** option.

To configure the filename for L2TP tracing operations:

- Specify the name of the file used for the trace output.

```
[edit services l2tp traceoptions]
user@host# set file l2tp_logfile_1
```

Configuring the Number and Size of L2TP Log Files

By default, when the trace file reaches 128 kilobytes (KB) in size, it is renamed ***filename*.0**, then ***filename*.1**, and so on, until there are three trace files. Then the oldest trace file (***filename*.2**) is overwritten.

You can optionally configure the maximum file size to be from 10 KB through 1 gigabyte (GB). You can also specify the number of trace files to be from 2 through 1000.

For example, you can set the maximum file size to 2 MB, and the maximum number of files to 20. When the file that receives the output of the tracing operation (***filename***) reaches 2 MB, ***filename*** is renamed ***filename*.0**, and a new file called ***filename*** is created. When the new ***filename*** reaches 2 MB, ***filename*.0** is renamed ***filename*.1** and ***filename*** is renamed ***filename*.0**. This process repeats until there are 20 trace files. Then the oldest file (***filename*.19**) is overwritten by the newest file (***filename*.0**).

To configure the number and size of trace files:

- Specify the name, number, and size of the file used for the trace output.

```
[edit protocols l2tp traceoptions]
user@host# set file l2tp_1 _logfile_1 files 20 size 2097152
```

Configuring Access to the L2TP Log File

By default, only the user who configures the tracing operation can access the log files. You can enable all users to read the log file and you can explicitly set the default behavior of the log file.

To specify that all users can read the log file:

- Configure the log file to be world-readable.

```
[edit services l2tp traceoptions]
user@host# set file l2tp_1 _logfile_1 world-readable
```

To explicitly set the default behavior, only the user who configured tracing can read the log file:

- Configure the log file to be no-world-readable.

```
[edit services l2tp traceoptions]
user@host# set file l2tp_1 _logfile_1 no-world-readable
```

Configuring a Regular Expression for L2TP LAC to Be Logged

By default, the trace operation output includes all lines relevant to the logged events.

You can refine the output by including regular expressions to be matched.

To configure regular expressions to be matched:

- Configure the regular expression.

  [edit services l2tp traceoptions]
  user@host# **set file l2tp_1 _logfile_1 match** ***regex***

Configuring the L2TP Tracing Flags

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
configuration	Trace configuration events
events	Trace interface events
general	Trace general events
gres	Trace GRES events
init	Trace daemon initialization
ipc-rx	Trace IPC receive events
ipc-tx	Trace IPC transmit events
memory	Trace memory management code
message	Trace message processing events
packet-error	Trace packet error events
parse	Trace parsing events
protocol	Trace L2TP events
receive-packets	Trace received L2TP packets
routing-processes	Trace routing process interactions
routing-socket	Trace routing socket events
session-db	Trace session database interactions

Flag	Description
states	Trace state machine events
timer	Trace timer events
transmit-packets	Trace transmitted L2TP packets
tunnel	Trace tunnel events

To configure the flags for the events to be logged:

- Configure the flags.

  [edit services l2tp traceoptions]
  user@host# **set flag *flag***

Verifying and Managing L2TP for Subscriber Access

Purpose View or clear information about L2TP tunnels and sessions.

Action

- To display the L2TP destinations:

  user@host> **show services l2tp destination**

- To clear L2TP destinations:

  user@host> **clear services l2tp destination**

- To display the L2TP sessions:

  user@host> **show services l2tp session**

- To clear L2TP sessions:

  user@host> **clear services l2tp session**

- To clear session statistics:

  user@host> **clear services l2tp session statistics**

- To display a summary of L2TP tunnels, sessions, errors, and control and data packets:

  user@host> **show services l2tp summary**

- To display the L2TP tunnels:

  user@host> **show services l2tp tunnel**

- To clear L2TP tunnels:

  user@host> **clear services l2tp tunnel**

- To clear L2TP tunnel statistics:

  user@host> **clear services l2tp tunnel statistics**

Related Documentation

- For more information see the *Junos System Basics and Services Command Reference*.

PART 7

Diameter Base Protocol and Applications for Subscriber Access

CHAPTER 18

Diameter Base Protocol Overview

Diameter Base Protocol Overview

The Diameter protocol is defined in *RFC 3588, Diameter Base Protocol*, and provides an alternative to RADIUS that is more flexible and extensible. The Diameter base protocol provides basic services to one or more applications (also called functions) that each runs in a different Diameter instance. The individual application provides the extended AAA functionality. Applications that use Diameter include Gx-Lite, JSRC, and PTSP.

Diameter peers communicate over a TCP transport layer connection by exchanging Diameter messages that convey status, requests, and acknowledgments by means of standard Diameter AVPs and application-specific AVPs. The Diameter transport layer configuration is based on Diameter network elements (DNEs); multiple DNEs per Diameter instance are supported. Currently only the predefined *master* Diameter instance is supported, but you can configure alternative values for many of the master Diameter instance values.

Each DNE consists of a prioritized list of peers and a set of routes that define how traffic is forwarded. Each route associates a destination with a function, a function partition, and a metric. When an application sends a message to a routed destination, all routes within the Diameter instance are examined for a match. When the best route to the destination has been selected, the message is forwarded by means of the DNE that includes that route.

Multiple routes to the same destination can exist within a given DNE and in different DNEs. In the case of multiple routes that match a request for forwarding, the best route is selected as follows:

1. The route with the lowest metric is selected.
2. In the event of a tie, the route with the highest specification score is selected.
3. In the event of another tie, then the names of the DNEs are compared in lexicographical order. The route in the DNE with the lowest value is selected. For example, dne-austin has a lower value than dne-boston.
4. If the routes are tied within the same DNE, then the route names are compared in lexicographical order. The route with the lowest value is selected.

The specification score of a route is 0 by default. Points are added to the score as follows:

- If the destination realm matches the request, add 1.
- If the destination host matches the request, add 2.
- If the function matches the request, add 3.
- If the function partition matches the request, add 4.

When the state of any DNE changes, the route lookup for all destinations is reevaluated. All outstanding messages to routed destinations are rerouted as needed, or discarded.

To configure a Diameter network element, include the **network-element** statement at the **[edit diameter]** hierarchy level. Include the **route** statement at the **[edit diameter network-element *element-name* forwarding]** hierarchy level. To configure a route for the DNE, include the **destination** (optional) , **function** (optional), and **metric** statements at the **[edit diameter network-element *element-name* forwarding route *dne-route-name*]** hierarchy level. Specify the Diameter peers associated with the DNE by including one or more **peer** statements at the **[edit diameter network-element *element-name*]** hierarchy level. Set the priority for each peer with the **priority** statement at the **[edit diameter network-element *element-name* peer *peer-name*]** hierarchy level.

Diameter requires you to configure information about the origin node; this is the endpoint node that originates Diameter for the Diameter instance. Include the **host** and **realm** statements at the **[edit diameter]** hierarchy level to configure the Diameter origin.

Each Diameter peer is specified by a name. Peer attributes include address and the destination TCP port used by active connections to this peer. To configure a Diameter peer, include the **peer** statement at the **[edit diameter]** hierarchy level. Include the **address** and **connect-actively** statements at the **[edit diameter peer *peer-name*]** hierarchy level. To configure the active connection, include the **port** statement at the **[edit diameter peer *peer-name* connect-actively]** hierarchy level.

Related Documentation

- Configuring Diameter on page 233
- Juniper Networks Session and Resource Control (SRC) and JSRC Overview on page 243
- Juniper Networks Session and Resource Control (SRC) and PTSP Overview on page 276

CHAPTER 19

Configuring Diameter Base Protocol

Configuring Diameter

You configure Diameter by specifying the remote peers, the endpoint origin attributes, and network elements that associate routes with peers. Only the master Diameter instance is currently supported. You can configure alternative values for the master instance only in the context of the master routing instance.

To configure Diameter base protocol:

1. Configure the origin realm and origin host of the diameter master instance.

   See “Configuring the Origin Attributes of the Diameter Instance” on page 234

2. Configure the Diameter peers.

   See “Configuring Diameter Peers” on page 234

3. (Optional) Configure the Diameter network elements.

   See “Configuring Diameter Network Elements” on page 235

4. (Optional) Configure trace options for troubleshooting the configuration.

   See “Tracing Diameter Base Protocol Processes” on page 236.

Configuring the Origin Attributes of the Diameter Instance

You can configure the identifying characteristics of the endpoint node that originates Diameter messages for the Diameter instance. The hostname is supplied as the value for the Origin-Host AVP by the Diameter instance. The realm is supplied as the value for the Origin-Realm AVP by the Diameter instance.

To configure the origin attributes for a Diameter instance:

1. Specify the name of the host that originates the Diameter message.

   ```
   [edit diameter origin]
   user@host# set host host14
   ```

2. Specify the realm of the host that originates the Diameter message.

   ```
   [edit diameter origin]
   user@host# set realm example.com
   ```

Related Documentation

- Configuring Diameter on page 233
- **origin on page 1004**

Configuring Diameter Peers

You can configure the peers to which Diameter sends messages. By default, logical system *default* and routing instance *master* are used. Port 3868 is used for active connections to peers by default.

To configure a remote peer for a Diameter instance:

1. Specify the name of the Diameter peer.

   ```
   [edit diameter]
   user@host# set peer p3
   ```

2. Specify the address of the Diameter peer.

   ```
   [edit diameter peer p3]
   user@host# set address 192.168.23.10
   ```

3. (Optional) Specify a routing instance, a logical system, or a logical system and routing instance for the Diameter peer.

   ```
   [edit diameter peer p3]
   user@host# set routing-instance ri8
   ```

   ```
   [edit diameter peer p3]
   user@host# set logical-system ls10
   ```

   ```
   [edit diameter peer p3]
   user@host# set logical-system ls10 routing-instance ri8
   ```

4. (Optional) Specify the port that Diameter uses for active connections to the peer.

   ```
   [edit diameter peer p3]
   user@host# set connect-actively port 49152
   ```

Related Documentation
- Configuring Diameter on page 233

Configuring Diameter Network Elements

A Diameter network element (DNE) consists of associated functions, a list of prioritized peers, and a set of forwarding rules. The forwarding rules define individual routes through a set of associated destinations, functions, and metrics.

Before you configure Diameter network elements, perform the following task:

- Define the Diameter peers. See "Configuring Diameter Peers" on page 234.

To configure a Diameter network element:

1. Specify the name of the network element.

   ```
   [edit diameter]
   user@host# set network-element dne25
   ```

2. (Optional) Associate one or more functions with the network element. All functions are associated by default.

   ```
   [edit diameter network-element dne25]
   user@host# set function jsrc
   ```

3. Associate a Diameter peer with the network element and set the priority for the peer.

   ```
   [edit diameter network-element dne25]
   user@host# set peer peer1 priority 1
   ```

4. Specify a route that is reachable through the network element based on the forwarding rules that you define.

   ```
   [edit diameter network-element dne25]
   user@host# set forwarding route dne-route2
   ```

5. Specify a metric for the route.

   ```
   [edit diameter network-element dne25 forwarding route dne-route2]
   user@host# set metric 15
   ```

6. (Optional) Associate the route with a destination host and realm.

   ```
   [edit diameter network-element dne25 forwarding route dne-route2]
   user@host# set destination host host5 realm example.com
   ```

7. (Optional) Specify a function (application) associated with the route.

   ```
   [edit diameter network-element dne25 forwarding route dne-route2]
   user@host# set function jsrc
   ```

Related Documentation
- Configuring Diameter on page 233

Tracing Diameter Base Protocol Processes

The Junos OS trace feature tracks Diameter base protocol operations and records events in a log file. By default, the tracing operation is inactive. To trace Diameter base protocol processes, you specify flags in the **traceoptions** statement at the **[edit system processes diameter-service]** hierarchy level.

The default tracing behavior is the following:

1. Important events are logged in a file called **jdiameterd** located in the **/var/log** directory. You cannot change the directory (**/var/log**) in which trace files are located.
2. When the file **jdiameterd** reaches 128 kilobytes (KB), it is renamed **jdiameterd.0**, then **jdiameterd.1**, and so on, until there are three trace files. Then the oldest trace file (**jdiameterd2**. is overwritten. For more information about how log files are created, see the *Junos OS System Log Messages Reference*.

By default, only the user who configures the tracing operation can access log files. You can optionally configure read-only access for other users.

The tracing options are described in the following sections:

Configuring the Diameter Base Protocol Trace Log Filename

By default, the name of the file that records trace output for Diameter base protocol is **jdiameterd**. You can specify a different name with the **file** option.

To configure the filename for Diameter base protocol tracing operations:

- Specify the name of the file used for the trace output.

```
[edit system processes diameter-service traceoptions]
user@host# set file diam_logfile_1
```

Configuring the Number and Size of Diameter Base Protocol Log Files

By default, when the trace file reaches 128 kilobytes (KB) in size, it is renamed ***filename*.0**, then ***filename*.1**, and so on, until there are three trace files. Then the oldest trace file (***filename*.2**) is overwritten.

You can optionally configure the maximum file size to be from 10 KB through 1 gigabyte (GB). You can also specify the number of trace files to be from 2 through 1000.

For example, you can set the maximum file size to 2 MB, and the maximum number of files to 20. When the file that receives the output of the tracing operation (***filename***) reaches 2 MB, ***filename*** is renamed ***filename*.0**, and a new file called ***filename*** is created. When the new ***filename*** reaches 2 MB, ***filename*.0** is renamed ***filename*.1** and ***filename*** is renamed ***filename*.0**. This process repeats until there are 20 trace files. Then the oldest file (***filename*.19**) is overwritten by the newest file (***filename*.0**).

To configure the number and size of trace files:

- Specify the name, number, and size of the file used for the trace output. (Diameter base protocol supports the **files** and **size** options for the **traceoptions** statement.)

  ```
  [edit system processes diameter-service traceoptions]
  user@host# set file diam_1 _logfile_1 files 20 size 2097152
  ```

Configuring Access to the Diameter Base Protocol Log File

By default, only the user who configures the tracing operation can access the log files. You can enable all users to read the log file and you can explicitly set the default behavior of the log file.

To specify that all users can read the log file:

- Configure the log file to be world-readable.

  ```
  [edit system processes diameter-service traceoptions]
  user@host# set file diam_1 _logfile_1 world-readable
  ```

To explicitly set the default behavior, only the user who configured tracing can read the log file:

- Configure the log file to be no-world-readable.

  ```
  [edit system processes diameter-service traceoptions]
  user@host# set file diam_1 _logfile_1 no-world-readable
  ```

Configuring a Regular Expression for Diameter Base Protocol Lines to Be Logged

By default, the trace operation output includes all lines relevant to the logged events.

You can refine the output by including regular expressions that will be matched.

To configure regular expressions to be matched:

- Configure the regular expression.

  ```
  [edit system processes diameter-service traceoptions]
  user@host# set file diam_1 _logfile_1 match regex
  ```

Configuring the Diameter Base Protocol Tracing Flags

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 events
application	Trace Diameter application interface events
configuration	Trace configuration events
daemon	Trace daemon level events
diameter-instance	Trace Diameter instance events
dne	Trace Diameter DNE events
framework	Trace Diameter framework
memory-management	Trace memory management events
messages	Trace Diameter messages
node	Trace Diameter node events
peer	Trace Diameter peer events

To configure the flags for the events to be logged:

- Configure the flags.

  [edit system processes diameter-service traceoptions]
  user@host# **set flag dne**

Troubleshooting Diameter Network Configuration

Problem A misconfiguration of the network can prevent Diameter from functioning properly. Configuration options for the Diameter base protocol are simple in the current release; this should simplify discovering where a misconfiguration exists.

The output of the **show diameter peer** command indicates a peer is in the no-activation state. In this case issue the **show diameter peer map** and **show diameter network-element map** commands to determine which network elements use the peer. The output of these commands can indicate why the peer is not activated. For example, all the associated network elements might have higher-priority peers in the open state.

The failed-to-forward counters are increasing in the output of the **show diameter function statistics detail** command. this can indicate that the routes to the peer are incorrectly

configured. Check the network connectivity, then use the **show diameter routes** command to determine whether application traffic is being correctly forwarded.

Cause Typical misconfigurations appear in the routes, peers, and network element configurations.

Solution Use the appropriate statements to correct the misconfiguration.

Related Documentation

- show diameter function statistics
- show diameter network-element map
- show diameter peer
- show diameter peer map
- show diameter route

Troubleshooting Diameter Network Connectivity

Problem In some circumstances, problems can arise with network connectivity to Diameter peers. The problem may originate with the peer or the peer host.

The output of the **show diameter peer** command indicates a peer is in the suspended, rejected, or bad-peer state.

Cause The suspended state indicates that the peer is not responding or has some other malfunction, or the network path to the peer does not exist.

The rejected state indicates that the network connection has been rejected by the peer.

The bad-peer state indicates that the network connection has been rejected by the router on which the peer resides.

Solution Determine how persistent the problem is by issuing the **show diameter peer statistics** ***peer-name*** **brief** command to check the connectivity statistics.

Related Documentation

- show diameter peer
- show diameter peer statistics

Verifying Diameter Node, Instance, and Route Information

Purpose View Diameter node information:

Action

- To display summary information about all Diameter nodes:

  user@host> **show diameter**

- To display the summary information about all Diameter nodes and add information about Diameter functions, instances, network elements, and peers:

  user@host> **show diameter brief**

- To display the brief information about all Diameter nodes and add information about Diameter routes:

  user@host> **show diameter detail**

- To display summary information about all Diameter instances:

  user@host> **show diameter instance**

- To display detailed information about all Diameter instances:

  user@host> **show diameter instance detail**

- To display information about a specific Diameter instance, add the instance name to the command:

  user@host> **show diameter instance master**

  user@host> **show diameter instance detail master**

- To display summary information about all Diameter routes:

  user@host> **show diameter route**

- To display detailed information about all Diameter routes:

  user@host> **show diameter route detail**

- To display information about a specific Diameter route, add the route name to the command:

  user@host> **show diameter route dne-route2**

  user@host> **show diameter route detail dne-route2**

Related Documentation

- For more information, see the *Junos OS System Basics and Services Command Reference*

Verifying and Managing Diameter Function Information

Purpose View or clear Diameter function information:

Action

- To display summary information about all functions associated with Diameter:

  user@host> **show diameter function**

- To display detailed information about all functions associated with Diameter:

  user@host> **show diameter function detail**

- To display information about a specific function associated with Diameter, add the function name to the command:

  user@host> **show diameter function jsrc**

  user@host> **show diameter function detail ptsp**

- To display summary statistics about all functions associated with Diameter:

  user@host> **show diameter function statistics**

- To display detailed statistics about all functions associated with Diameter:

  user@host> **show diameter function statistics detail**

- To display statistics about a specific function associated with Diameter, add the function name to the command:

  user@host> **show diameter function statistics gx-lite**

  user@host> **show diameter function statistics detail jsrc**

- To delete current statistics for all functions associated with Diameter:

  user@host>**clear diameter function statistics**

- To delete current statistics for a specific function associated with Diameter:

  user@host>**clear diameter function gx-lite statistics**

Related Documentation

- For more information, see the *Junos OS System Basics and Services Command Reference*

Verifying and Managing Diameter Peer Information

Purpose View or clear Diameter peer information:

Action

- To display summary information about all Diameter peers:

  user@host> **show diameter peer**

- To display detailed information about all Diameter peers:

  user@host> **show diameter peer detail**

- To display information about a specific Diameter peer, add the peer name to the command:

  user@host> **show diameter peer peer235**

  user@host> **show diameter peer detail peer235**

- To display summary information about Diameter peer-to-network-element mapping for all peers:

  user@host> **show diameter peer map**

- To display detailed information about Diameter peer-to-network-element mapping for all peers:

  user@host> **show diameter peer map detail**

- To display information about Diameter peer-to-network-element mapping for a specified peer, add the peer name to the command:

  user@host> **show diameter peer map peer235**

  user@host> **show diameter peer map detail peer235**

- To display summary statistics about all Diameter peers:

  user@host> **show diameter peer statistics**

- To display detailed statistics about all Diameter peers:

  user@host> **show diameter peer statistics detail**

- To display summary statistics about a specified Diameter peer:

user@host> **show diameter peer statistics peer235**

- To display detailed statistics about a specified Diameter peer:

  user@host> **show diameter peer statistics detail peer235**

- To delete the specified Diameter peer and all of its statistics.

  user@host>**clear diameter peer peer5 connection**

- To delete the specified Diameter peer and its current statistics:

  user@host>**clear diameter peer peer5 statistics**

Related Documentation

- For more information, see the *Junos OS System Basics and Services Command Reference*

Verifying Diameter Network Element Information

Purpose View Diameter network element information:

Action

- To display summary information about Diameter network elements:

  user@host> **show diameter network-element**

- To display detailed information about Diameter network elements:

  user@host> **show diameter network-element detail**

- To display information about Diameter network elements for a specified network element, include the element name in the command:

  user@host> **show diameter network-element dne-1**

  user@host> **show diameter network-element detail dne-1**

- To display summary information about Diameter network-element-to-peer mapping for all network elements:

  user@host> **show diameter network-element map**

- To display detailed information about Diameter network-element-to-peer mapping for all network elements:

  user@host> **show diameter network-element map detail**

Related Documentation

- For more information, see the *Junos OS System Basics and Services Command Reference*

CHAPTER 20

JSRC and Juniper Networks Session Resource Control (SRC) Overview

Juniper Networks Session and Resource Control (SRC) and JSRC Overview

The Juniper Networks Session and Resource Control (SRC) environment provides a central administrative point for managing subscribers and their services. The SRC software runs on Juniper Networks C Series Controllers. The SRC software uses the Diameter protocol for communications between the local SRC peer on a Juniper Networks routing platform and the remote SRC peer on a C Series Controller. The local SRC peer is known as JSRC and is part of the AAA application. The remote SRC peer is the service activation engine (SAE); the SAE acts as the controlling agent in the SRC environment. JSRC and the SAE jointly provide the remote control enforcement functionality (RCEF).

JSRC has the following responsibilities:

- Request address authorization from the SAE.
- Request service activations from the SAE.
- Activate and deactivate services as specified by the SAE. JSRC can activate multiple policies with the same service (dynamic profile) name.
- Log out subscribers as specified by the SAE.
- Update the SAE with status of new service activations and deactivations.
- Synchronize subscriber state and service information with the SAE.
- Notify the SAE when subscribers log out.

The SRC software enables the SAE to activate and deactivate subscriber services (described by SRC policies) and log out subscribers. The SAE can control only those resources that have been provisioned through SAE. Therefore, the SAE receives information about only those subscribers for whom JSRC has requested provisioning from the SAE. For example, when a subscriber logs in, but the configuration did not require

the session activation path to include SAE provisioning, the SAE does not receive information about this subscriber and cannot control the subscriber session.

Similarly, the SAE can control only the subscriber services that it has activated. When a service is not activated from the SAE—a RADIUS-activated service, for example—the SAE receives no information about the service and has no control over it.

Hardware Requirements for JSRC for Subscriber Access

JSRC is supported on Juniper Networks MX Series Ethernet Services Routers. JSRC currently supports subscriber sessions on static and dynamic interfaces.

Related Documentation

- Configuring JSRC on page 251
- Diameter Messages Exchanged by JSRC and the SAE on page 244
- Understanding JSRC-SAE Interactions on page 248

Diameter Messages Exchanged by JSRC and the SAE

JSRC is a Juniper Networks Diameter application registered with the IANA (http://www.iana.org) as Juniper Policy-Control-JSRC, with an ID of 16777244. JSRC and the SAE communicate by exchanging the Diameter messages described in Table 31 on page 244.

Table 31: Diameter Messages Used by JSRC and the SAE

Diameter Message	Code	Description
AA-Request (AAR)	265	Request from JSRC to the SAE at subscriber login or during SAE-JSRC synchronization. The request can be one of three types: address-authorization, provisioning-request, or synchronization.
AA-Answer (AAA)	265	Response from the SAE to the JSRC AA-Request message.
Abort-Session-Request (ASR)	274	Request from the SAE to JSRC to log out a provisioned subscriber.
Abort-Session-Answer (ASA)	274	Response from JSRC to the SAE ASR message. If the application sends the logout request to AAA, the ASA message includes a success notification (ACK). If the logout failed, the ASA message includes a failure notification (NAK).
Push-Profile-Request (PPR)	288	Request from the SAE to JSRC to activate or deactivate services after a subscriber logs in.
Push-Profile-Answer (PPA)	288	Response from JSRC to the SAE PPR message. Includes success or failure notification for each of the service activation or deactivation commands in the request.
Session-Resource-Query (SRQ)	277	Request from JSRC to the SAE or from the SAE to JSRC to initiate synchronization between JSRC and the SAE.

Table 31: Diameter Messages Used by JSRC and the SAE *(continued)*

Diameter Message	Code	Description
Session-Resource-Reply (SRR)	277	Response to the SRQ message to begin synchronization.
Session-Termination-Request (STR)	275	Notification from JSRC to the SAE that a provisioned subscriber has logged out.
Session-Termination-Answer (STA)	275	Response from the SAE to the JSRC STR message

Related Documentation

- Configuring JSRC on page 251
- Juniper Networks Session and Resource Control (SRC) and JSRC Overview on page 243
- Understanding Diameter AVPs on page 245
- Understanding JSRC-SAE Interactions on page 248

Understanding Diameter AVPs

Diameter conveys information by including various attribute-value pairs (AVPs) in Diameter messages. Table 32 on page 245 lists the standard Diameter AVPs used in JSRC interactions.

Table 32: Standard Diameter AVPs

Code Number	Diameter AVP	Description	Type
1	User-Name	Specifies the username. For a subscriber managed by AAA, the value is the subscriber's login name. For a static interface, the value is the interface name, which is used as the subscriber's login name.	UTF8String

Table 32: Standard Diameter AVPs *(continued)*

Code Number	Diameter AVP	Description	Type
268	Result-Code	Indicates whether a request completed successfully. Provides an error code if the request failed. The following classes are recognized by Diameter: • 1xxx—Informational • 2xxx—Success • 3xxx—Protocol errors • 4xxx—Transient errors • 5xxx—Permanent failures Unrecognized classes, which begin with numerals 6–9 or 0, are handled as permanent failures. JSRC supports the following values; all non-success values are treated as permanent failures: • 1001—DIAMETER_MULTI_ROUND_AUTH • 2001—DIAMETER_SUCCESS • 5002—DIAMETER_UNKNOWN_SESSION_ID • 5012—DIAMETER_UNABLE_TO_COMPLY	Unsigned32
277	Auth-Session-State	Indicates whether AAA session state is maintained. • 0—STATE_MAINTAINED • 1—NO_STATE_MAINTAINED	Enumerated
295	Termination-Cause	Indicates the reason why a session was terminated on the access device. • 1—DIAMETER_LOGOUT • 2—DIAMETER_SERVICE_NOT_PROVIDED • 3—DIAMETER_BAD_ANSWER • 4—DIAMETER_ADMINISTRATIVE • 5—DIAMETER_LINK_BROKEN • 6—DIAMETER_AUTH_EXPIRED • 7— DIAMETER_USER_MOVED • 8—DIAMETER_SESSION_TIMEOUT	Enumerated

Juniper Networks AVPs are used in addition to the standard Diameter AVPs. These AVPs have an enterprise number of 2636. Table 33 on page 246 lists the Juniper Networks AVPs used in JSRC interactions.

Table 33: Juniper Networks Diameter AVPs

Code Number	Diameter AVP	Description	Type
2010	Juniper-DHCP-Options	Specifies the client's DHCP options.	OctetString
2011	Juniper-DHCP-GI-Address	Specifies the DHCP relay agent's IP address.	OctetString

Table 33: Juniper Networks Diameter AVPs *(continued)*

Code Number	Diameter AVP	Description	Type
2020	Juniper-Policy-Install	Specifies policies to be activated for the subscriber. Includes Juniper-Policy-Name and Juniper-Policy-Definition	Grouped
2021	Juniper-Policy-Name	Defines the name of a policy decision.	OctetString
2022	Juniper-Policy-Definition	Defines a policy decision. Includes Juniper-Policy-Name, Juniper-Template-Name, and Juniper-Substitution.	Grouped
2023	Juniper-Template-Name	Profile name defined by the router.	UTF8String
2024	Juniper-Substitution	Defines the substitution attributes. Includes Juniper-Substitution-Name and Juniper-Substitution-Value.	OctetString
2025	Juniper-Substitution-Name	Defines the name of the variable to be replaced.	OctetString
2026	Juniper-Substitution-Value	Defines the value of the variable to be replaced.	OctetString
2027	Juniper-Policy-Remove	Specifies policies to be deactivated for the subscriber. Includes Juniper-Policy-Name.	Grouped
2035	Juniper-Policy-Failed	Specifies the name of the policy activation or deactivation that failed.	OctetString
2038	Juniper-Policy-Success	Specifies the name of the policy activation or deactivation that succeeded.	OctetString
2046	Juniper-Logical-System	Specifies the logical system.	UTF8String
2047	Juniper-Routing-Instance	Specifies the routing instance.	UTF8String
2048	Juniper-Jsrc-Partition	Specifies the logical system and routing instance for the subscriber or request. Includes Juniper-Logical-System and Juniper-Routing-Instance	Grouped
2050	Juniper-Request-Type	Describes the type of request: • 1—ADDRESS_AUTHORIZATION • 2—PROVISIONING_REQUEST • 3—SYNCHRONIZATION	Enumerated
2051	Juniper-Synchronization-Type	Describes the type of synchronization: • 1—FULL-SYNC • 2—FAST-SYNC • 3—NO-STATE-TO-SYNC	Enumerated

Table 33: Juniper Networks Diameter AVPs *(continued)*

Code Number	Diameter AVP	Description	Type
2052	Juniper-Synchronization	Describes the state of synchronization: • 1—NO-SYNC; this is the default state • 2—SYNC-IN-PROGRESS • 3—SYNC-COMPLETE	Enumerated

Related Documentation

- Diameter Messages Exchanged by JSRC and the SAE on page 244
- Understanding JSRC-SAE Interactions on page 248

Understanding JSRC-SAE Interactions

This topic describes the sequences of Diameter messages exchanged between JSRC and the SAE as they interact to perform the following tasks for subscriber access:

- Subscriber login
- Service activation
- Service deactivation
- Resynchronization
- SAE-initiated subscriber logout
- Subscriber-initiated logout

Subscriber Login

JSRC authorization is enabled for DHCP subscribers when you include the **authorization-order jsrc** statement at the **[edit access profile *profile-name*]** hierarchy level. This setting causes AAA to ignore the authentication order setting in the access profile. As a result, AAA does not authenticate the DHCP subscribers. For non-DHCP subscribers, AAA ignores the **authorization-order** statement.

When a DHCP subscriber attempts to log in, DHCP sends an authentication request to AAA. In turn, JSRC sends a Diameter AA-Request message to the SAE. SAE returns a Diameter AA-Answer message that can include the Framed-IP-Address attribute and the Juniper-DHCP-Options AVP (AVP code 2010). JSRC ignores any other optional AVPs included in this AA-Answer message.

JSRC provisioning is enabled for DHCP (and SSC) subscribers when you include the **provisioning-order** statement at the **[edit access profile *profile-name*]** hierarchy level. When the application requests AAA to activate the subscriber's session, JSRC sends an AA-Request message that includes the Juniper-Request-Type AVP (AVP code 2050) with a value that indicates service provisioning is requested from the SAE.

The SAE returns a AA-Answer message that contains an ACK if the request is accepted or a NAK if the request is denied. If the request is accepted, the AA-Answer message

includes the Juniper-Policy-Install AVP (AVP code 2020), which is used to specify the service to attach to the subscriber's interface. When this AVP is included, the SAE sets the Result-Code AVP to 1001 (DIAMETER_MULTI_ROUND_AUTH). This code means that the JSRC must send another AA-Request message to the SAE to report the success or failure of the policy instantiation (service activation) by AAA. JSRC ignores any other optional AVPs included in this AA-Answer message. The SAE returns an AA-Answer message to acknowledge this second AA-Request message.

Subscriber Service Activation and Deactivation

SAE policies provision subscriber services. After a subscriber is logged in, the SAE can send a PPR message to JSRC to activate or deactivate services. A given PPR can include the Juniper-Policy-Install AVP (AVP code 2020) to activate a service, the Juniper-Policy-Remove AVP (AVP code 2027) to deactivate a service, or both (for different services). A PPR can include no more than three of these AVPs (install, remove, or mixed).

JSRC sends a PPA message to the SAE when it has completed the tasks requested in the PPR. The PPA indicates the success or failure of the actions requested in the PPR.

NOTE: If you use RADIUS or the CLI to deactivate a service that the SAE, the SAE becomes unsynchronized with the state of subscribers on the routing engine.

Subscriber Resynchronization

During resynchronization, JSRC informs the SAE about the services that are active for the provisioned subscribers. Either JSRC or the SAE initiates the resynchronization.

- The SAE initiates resynchronization at startup or when a backup SAE takes over session control due to resource limits or conditions on the primary SAE. The SAE clears its database of all entries in preparation for the synchronization.
- JSRC initiates resynchronization at JSRC startup, such as when AAA starts or restarts.

  JSRC can also initiate resynchronization in another circumstance. When an SAE in a multi-SAE environment becomes active, it must send an SRQ to JSRC as its first message. JSRC then locks the Origin-Host AVP of the active SAE. JSRC subsequently triggers resynchronization if it receives a message from any other SAE as indicated by the Origin-Host AVP. Such an incident can occur if communication between the active SAE and a standby SAE is interrupted.

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- The SAE initiates resynchronization at startup or when a backup SAE takes over session control due to resource limits or conditions on the primary SAE. The SAE clears its database of all entries in preparation for the synchronization.
- JSRC initiates resynchronization at JSRC startup, such as when AAA starts or restarts.

  JSRC can also initiate resynchronization in another circumstance. When an SAE in a multi-SAE environment becomes active, it must send an SRQ to JSRC as its first

message. JSRC then locks the Origin-Host AVP of the active SAE. JSRC subsequently triggers resynchronization if it receives a message from any other SAE as indicated by the Origin-Host AVP. Such an incident can occur if communication between the active SAE and a standby SAE is interrupted.

Both entities initiate a resynchronization by sending an SRQ message. The recipient responds with an SRR message. After the SRR is sent, regardless of whether the SAE or JSRC initiates the synchronization, JSRC sends an AA-Request message to the SAE for each provisioned subscriber present in the session database. The AA-Request message includes a Juniper-Policy-Install AVP for the active services. The SAE returns an AA-Answer message with an ACK to acknowledge receipt.

Subscriber Session Terminated by the SAE

When the SAE terminates a subscriber session, it sends an ASR message to JSRC. JSRC causes AAA to send a logout request to the DHCP (or SSC) client application. When the DHCP client application accepts the logout request, JSRC includes an ACK in the ASR message it sends to the SAE to signify success. If the DHCP client application does not accept the request, then JSRC includes a NAK in the ASR to signify failure. The DHCP client application is responsible for initiating the actual logout sequence with AAA.

Subscriber Logout

When the DHCP (or SSC) client application sends a subscriber logout notice to AAA, JSRC sends an STR message to notify the SAE that the provisioned subscriber session is being terminated. The SAE returns an STA message to JSRC, and JSRC notifies DHCP that the logout is complete.

Related Documentation

- Configuring JSRC on page 251
- Juniper Networks Session and Resource Control (SRC) and JSRC Overview on page 243
- Diameter Messages Exchanged by JSRC and the SAE on page 244
- Understanding Diameter AVPs on page 245

CHAPTER 21

Configuring JSRC for Subscriber Access

Configuring JSRC

You can configure the JSRC client application to work with Session and Resource Control (SRC) to centrally manage subscribers and services. JSRC requests address and service authorizations from the remote SRC peer (the SAE), activates and deactivates services as specified by the SAE, logs out subscribers as specified by the SAE, and synchronizes subscriber state and service information with the SAE.

To configure JSRC:

1. Configure the JSRC partition.

   See “Configuring the JSRC Partition” on page 252.

2. Assign the JSRC partition.

   See “Assigning a Partition to JSRC” on page 253.

3. Configure JSRC authorization for subscribers.

   See “Authorizing Subscribers with JSRC” on page 253.

4. Configure JSRC provisioning for subscribers.

   See “Provisioning Subscribers with JSRC” on page 254.

Related Documentation

- Juniper Networks Session and Resource Control (SRC) and JSRC Overview on page 243

Configuring the JSRC Partition

JSRC works within a specific logical system:routing instance context, called a partition.

NOTE: Currently, only a single partition is supported; you must configure it within the default logical system:routing instance context.

Before you configure the JSRC partition, perform the following task:

- Configure the Diameter instance at the **[edit diameter]** hierarchy level. See "Configuring Diameter" on page 233.

Configuration for the JSRC partition consists of naming the partition and then associating a Diameter instance, the SAE hostname, and the SAE realm with the partition.

To configure the JSRC partition:

1. Create the partition.

   ```
   [edit jsrc]
   user@host# set partition partition1
   ```

2. Specify the Diameter instance for the JSRC partition.

   NOTE: Currently, only the default Diameter instance, *master*, is supported.

   ```
   [edit jsrc partition partition1]
   user@host# set diameter-instance master
   ```

3. Configure the destination host for the JSRC partition.

   ```
   [edit jsrc partition partition1]
   user@host# set destination-host sae1
   ```

4. Configure the destination realm for the JSRC partition.

   ```
   [edit jsrc partition partition1]
   user@host# set destination-realm generic.example.com
   ```

Related Documentation

- Configuring JSRC on page 251

Assigning a Partition to JSRC

You must associate a configured JSRC partition with the JSRC instance that you are configuring.

Before you assign a partition to JSRC, perform the following task:

- Configure the JSRC partition. See "Configuring the JSRC Partition" on page 252

To assign the JSRC partition:

- Specify the partition name.

```
[edit jsrc]
user@host# set jsrc-partition partition1
```

Related Documentation

- Configuring JSRC on page 251

Authorizing Subscribers with JSRC

You can configure AAA to use JSRC in an SRC environment to request authorization from the SAE when AAA is verifying whether a DHCP subscriber can access the router. When JSRC authorization is configured, AAA ignores any configured authentication order settings.

Before you configure JSRC authorization, perform the following tasks:

- Create the subscriber access profile at the **[edit access profile]** hierarchy level.
- Define the subscriber username with the **username-include** statement in the authentication configuration for DHCP local server or DHCP relay.

To configure JSRC authorization:

- Specify **jsrc** as the authorization method in the profile.

```
[edit access profile dhcpsub1]
user@host# set authorization-order jsrc
```

Related Documentation

- Configuring JSRC on page 251
- Creating Unique Usernames for DHCP Clients on page 111
- **profile on page 1039**

Provisioning Subscribers with JSRC

You can configure AAA to use JSRC in an SRC environment to request provisioning from the SAE to instantiate services for an authenticated subscriber.

Before you configure JSRC provisioning for subscribers, perform the following task:

- Create the subscriber access profile at the **[edit access profile]** hierarchy level.

To configure JSRC provisioning:

- Specify **jsrc** as the provisioning method in the profile.

```
[edit access profile dhcpsub1]
user@host# set provisioning-order jsrc
```

Related Documentation

- Configuring JSRC on page 251

CHAPTER 22

Subscribers on Static Interfaces

Subscribers on Static Interfaces Overview

You can associate subscribers with statically configured interfaces and provide dynamic service activation and activation for these subscribers. When the static interface comes up, the event is treated as a subscriber login. When the interface goes down, it is treated as a subscriber logout. After the subscribers are present in the session database (SDB), JSRC can report the subscribers to the SAE so that the SRC software can subsequently manage the subscribers.

Alternatively, you can configure the static subscribers to be authenticated and authorized by means of RADIUS. In this case, RADIUS can then activate and deactivate services with change of authorization (CoA) messages. However, this configuration does not prevent the interface from coming up and forwarding traffic. Further, authorization parameters are not imposed on the subscriber interface.

Currently, only Ethernet interfaces support static subscribers. Only one static subscriber can exist over a given interface. An interface cannot appear in more than one group. Static subscribers cannot be created over dynamic interfaces.

Static subscribers are intended to work with JSRC. Include the **provisioning-order jsrc** statement at the **[edit access profile *profile-name*]** hierarchy level to enable JSRC to handle the subscribers at the direction of the SRC software.

If the authentication request fails for a static subscriber, a 60-minute, nonconfigurable timer begins counting down. The request is reissued when the timer expires. This action repeats for as long as the interface is operationally up.

You can force a logout of the static subscriber by issuing the **request services static-subscribers logout interface *interface-name*** command. A static subscriber can also be logged out by AAA or an external policy manager. In both cases, no subsequent logins can take place on the underlying interface until you reset the state by issuing the **request services static-subscribers login interface *interface-name*** command or the router or process reboots.

You can log out an interface group by issuing the **request services static-subscriber logout group *group-name*** command. You can subsequently log in a group of interfaces by issuing the **request services static-subscriber login group *group-name*** command.

No new CLI statements are required to configure the dynamic profile for static subscribers. The dynamic profile can be very simple; it is activated at login and deactivated at logout. If you do not configure a profile, then the *junos-default-profile* is automatically activated.

During a graceful Routing Engine switchover (GRES) event, active static subscribers are recovered, inactive subscribers are cleaned up, and logout continues for subscribers that were in the process of logging out.

Include the **static-subscribers** statement at the **[edit system services]** hierarchy level to configure static subscribers. Include the **traceoptions** statement at the **[edit system processes static-subscribers]** hierarchy level to configure tracing operations for static subscribers.

You can configure the access profile, dynamic profile, and authentication parameters for all static subscribers or for a particular group of static subscribers:

- To configure the access profile that triggers AAA services for the static subscriber for all static subscribers, include the **access-profile** statement at the **[edit system services static-subscribers]** hierarchy level. Alternatively, include this statement at the **[edit system services static-subscribers group *group-name*]** hierarchy level to apply the profile to a specific group and override a top-level configuration.
- To configure the dynamic profile that is instantiated when the static subscriber logs in for all static subscribers, include the **dynamic-profile** statement at the **[edit system services static-subscribers]** hierarchy level. Alternatively, include this statement at the **[edit system services static-subscribers group *group-name*]** hierarchy level to apply the profile to a specific group and override a top-level configuration. Do not specify a dynamic profile that creates a dynamic interface.
- To configure the authentication parameters that trigger an Access-Request message to AAA for all static subscribers, include the **authentication** statement at the **[edit system services static-subscribers]** hierarchy level. Alternatively, include the statement at the **[edit system services static-subscribers group *group-name*]** hierarchy level to configure authentication for a specific group and override a top-level configuration. If you do not configure authentication, then by default the interface name is modified and used as the default username for the subscriber session and the authentication request.

The configurable authentication parameters include the password and details of how the username is formed. Include the **password** statement at the **[edit system services static-subscribers authentication]** hierarchy level to configure the authentication password for all static subscribers. Alternatively, include the statement at the **[edit system services static-subscribers group *group-name* authentication]** hierarchy level to configure authentication for a specific group and override a top-level configuration.

The username that is sent to AAA for authentication must include at least one of the following attributes:

- the domain name
- a user prefix
- the interface name
- a logical system name
- routing instance name

To configure how the username is formed for all static subscribers, include the desired statements at the **[edit system services static-subscribers authentication]** hierarchy level: **domain-name**, **user-prefix**, **logical-system-name**, or **routing-instance-name**. Alternatively, include the desired statements at the **[edit system services static-subscribers group *group-name* authentication]** hierarchy level to configure the username for a specific group and override a top-level configuration.

If you change the authentication configuration for an existing group or for static subscribers globally, the change has no effect on existing static subscribers. The changes are applied only to any new logins that are attempted after you commit the changes.

A group configuration must specify all the interfaces that you expect to support static subscribers. Include the **interface** statement at the **[edit system services static-subscribers group *group-name*]** hierarchy level to specify the interfaces. This statement enables you to specify a single interface or a range of interfaces.

You must also statically configure these interfaces before any static subscribers can be supported on them. You must configure the static interfaces in the same logical system and routing instance as the group that includes the interfaces.

If you change the interfaces that are included in an existing interface group, existing static subscribers are automatically logged out and then back in when you commit the changes. However, changes made to the configuration of the interface itself have no effect on the login or logout state of the static subscriber associated with that interface.

By default, multiple subscribers are not supported on top of the same VLAN logical interface. If you want to support this behavior, then you can manage multiple subscribers on a single logical interface in one of two ways. You can either merge attributes such as firewall filters and CoS attributes for the multiple subscribers, or you can replace the current attributes with those of a new subscriber whenever a new subscriber logs into the underlying VLAN logical interface.

- To enable attribute merging for all static interfaces, include the **aggregate-clients merge** statement at the **[edit system services static-subscribers]** hierarchy level. Alternatively, include this statement at the **[edit system services static-subscribers group *group-name*]** hierarchy level to enable attribute merging for a specific group of static interfaces and override a top-level configuration.
- To enable attribute replacement for all static interfaces, include the **aggregate-clients replace** statement at the **[edit system services static-subscribers]** hierarchy level.

Alternatively, include this statement at the **[edit system services static-subscribers group *group-name*]** hierarchy level to enable attribute replacement for a specific group of static interfaces and override a top-level configuration.

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259
- Juniper Networks Session and Resource Control (SRC) and JSRC Overview on page 243
- Understanding JSRC-SAE Interactions on page 248

CHAPTER 23

Configuring Subscribers over Static Interfaces

Configuring Subscribers over Static Interfaces

This topic describes the procedure for configuring subscribers over static interfaces (static subscribers).

Before you configure subscribers over static interfaces, perform the following tasks:

- Configure the static interfaces on which you want to create and manage subscribers.
- Create an access profile to trigger AAA services for static subscribers.

- Create a dynamic profile that is instantiated when static subscribers log in.

To configure static subscribers:

1. Configure trace options for troubleshooting the configuration.

   See “Tracing Static Subscriber Operations” on page 261

2. Specify the global access profile that triggers AAA services for static subscribers.

   See “Specifying the Static Subscriber Global Access Profile” on page 263.

3. Specify the global dynamic profile that is instantiated when static subscribers log in.

   See “Specifying the Static Subscriber Global Dynamic Profile” on page 264.

4. Configure global method to handle multiple subscribers on a VLAN Logical Interface.

   See “Enabling Multiple Subscribers on a VLAN Logical Interface for All Static Subscribers” on page 264

5. Configure the global authentication password for static subscribers.

   See “Configuring the Static Subscriber Global Authentication Password” on page 265.

6. Configure the global username for static subscribers.

   See “Configuring the Static Subscriber Global Username” on page 265.

7. Configure a group of subscribers to share values different from the global configuration.

   See “Creating a Static Subscriber Group” on page 266 .

8. Specify the access profile for the static subscriber group.

   See “Specifying the Static Subscriber Group Access Profile” on page 267.

9. Specify the dynamic profile for the static subscriber group.

   See “Specifying the Static Subscriber Group Dynamic Profile” on page 267.

10. Configure method to handle multiple subscribers on a VLAN Logical Interface for a static subscriber group.

    See “Enabling Multiple Subscribers on a VLAN Logical Interface for a Static Subscriber Group” on page 268

11. Configure the authentication password for the static subscriber group.

    See “Configuring the Static Subscriber Group Authentication Password” on page 268.

12. Configure the username for the static subscriber group.

    See “Configuring the Static Subscriber Group Username” on page 269.

13. (Optional) Force a static subscriber to be logged out from an interface.

    See “Forcing a Static Subscriber to Be Logged Out” on page 270

14. (Optional) Enable an interface to accept static subscriber logins.

    See “Resetting the State of an Interface for Static Subscriber Login” on page 270

15. (Optional) Force static subscribers to be logged out from a group of interfaces.

See “Forcing a Group of Static Subscribers to Be Logged Out” on page 270

16. (Optional) Enable a group of interfaces to accept static subscriber logins.

    See “Resetting the State of an Interface Group for Static Subscriber Login” on page 271

17. Configure trace options for troubleshooting the configuration.

    See “Tracing Static Subscriber Operations” on page 261

Related Documentation

- Subscribers on Static Interfaces Overview on page 255
- [edit system services static-subscribers] Hierarchy Level on page 756

Tracing Static Subscriber Operations

The Junos OS trace feature tracks static subscriber operations and records events in a log file. The error descriptions captured in the log file provide detailed information to help you solve problems.

By default, nothing is traced. When you enable the tracing operation, the default tracing behavior is as follows:

1. Important events are logged in a file called **jsscd** located in the **/var/log** directory. You cannot change the directory (**/var/log**) in which trace files are located.
2. When the file **jsscd** reaches 128 kilobytes (KB), it is renamed **jsscd.0**, then **jsscd.1**, and so on, until there are three trace files. Then the oldest trace file (**jsscd.2**) is overwritten.

   You can optionally configure the maximum file size to be from 10 KB through 1 gigabyte (GB). You can also specify the number of trace files to be from 2 through 1000. (For more information about how log files are created, see the *Junos OS System Log Messages Reference*.)

By default, only the user who configures the tracing operation can access log files. You can optionally configure read-only access for other users.

The static subscriber traceoptions operations are described in the following sections:

- Configuring the Static Subscribers Trace Log Filename on page 261
- Configuring the Number and Size of Static Subscribers Log Files on page 262
- Configuring Access to the Static Subscribers Log File on page 262
- Configuring a Regular Expression for Static Subscriber Lines to Be Logged on page 262
- Configuring the Static Subscribers Tracing Flags on page 263

Configuring the Static Subscribers Trace Log Filename

By default, the name of the file that records trace output for static subscribers is **jsscd**. You can specify a different name with the **file** option.

To configure the filename for static subscribers tracing operations:

- Specify the name of the file used for the trace output.

```
[edit system processes static-subscribers traceoptions]
user@host# set file stat-subs_1
```

Configuring the Number and Size of Static Subscribers Log Files

By default, when the trace file reaches 128 kilobytes (KB) in size, it is renamed ***filename*.0**, then ***filename*.1**, and so on, until there are three trace files. Then the oldest trace file (***filename*.2**) is overwritten.

You can optionally configure the maximum file size to be from 10 KB through 1 gigabyte (GB). You can also specify the number of trace files to be from 2 through 1000.

For example, you can set the maximum file size to 2 MB, and the maximum number of files to 20. When the file that receives the output of the tracing operation (***filename***) reaches 2 MB, ***filename*** is renamed ***filename*.0**, and a new file called ***filename*** is created. When the new ***filename*** reaches 2 MB, ***filename*.0** is renamed ***filename*.1** and ***filename*** is renamed ***filename*.0**. This process repeats until there are 20 trace files. Then the oldest file (***filename*.19**) is overwritten by the newest file (***filename*.0**).

To configure the number and size of trace files:

- Specify the name, number, and size of the file used for the trace output.

  ```
  [edit system processes static-subscribers traceoptions]
  user@host# set file stat-subs_1 _logfile_1 files 20 size 2097152
  ```

Configuring Access to the Static Subscribers Log File

By default, only the user who configures the tracing operation can access the log files. You can enable all users to read the log file and you can explicitly set the default behavior of the log file.

To specify that all users can read the log file:

- Configure the log file to be world-readable.

  ```
  [edit system processes static-subscribers traceoptions]
  user@host# set file stat-subs_1 _logfile_1 world-readable
  ```

To explicitly set the default behavior, only the user who configured tracing can read the log file:

- Configure the log file to be no-world-readable.

  ```
  [edit system processes static-subscribers traceoptions]
  user@host# set file stat-subs_1 _logfile_1 no-world-readable
  ```

Configuring a Regular Expression for Static Subscriber Lines to Be Logged

By default, the trace operation output includes all lines relevant to the logged events.

You can refine the output by including regular expressions to be matched.

To configure regular expressions to be matched:

- Configure the regular expression.

  ```
  [edit system processes static-subscribers traceoptions]
  user@host# set file stat-subs_1 _logfile match regex
  ```

Configuring the Static Subscribers Tracing Flags

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
authentication	Trace authentication events
configuration	Trace configuration events
database	Trace database events
general	Trace general flow.
gres	Trace GRES events
profile	Trace dynamic profile events
rtsock	Trace routing socket events
statistics	Trace statistics events
subscriber	Trace subscriber events

To configure the flags for the events to be logged:

- Configure the flags.

  ```
  [edit system processes static-subscribers traceoptions]
  user@host# set flag authentication
  ```

Specifying the Static Subscriber Global Access Profile

You specify a previously created access profile that triggers AAA services for all static subscribers. This value can be overridden for a group of static subscribers when a different profile is configured for that group.

To specify the access profile used for all static subscribers:

- Specify the profile name.

```
[edit system services static-subscribers]
user@host# set access-profile access5
```

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259
- Specifying the Static Subscriber Group Access Profile on page 267
- **profile on page 1039**

Specifying the Static Subscriber Global Dynamic Profile

You specify a previously created dynamic profile that is instantiated when a static subscriber logs in. This profile is used for all static subscribers. This value can be overridden for a group of static subscribers when a different profile is configured for that group.

To specify the dynamic profile used for all static subscribers:

- Specify the profile name.

```
[edit system services static-subscribers]
user@host# set dynamic-profile dyn-profile-1
```

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259
- Specifying the Static Subscriber Group Dynamic Profile on page 267
- **dynamic-profiles on page 860**

Enabling Multiple Subscribers on a VLAN Logical Interface for All Static Subscribers

For a given interface, only a single static subscriber (or group) is logged in. Although we do not recommend this practice, you might have other kinds of subscribers configured on the same interface, such as a DHCP subscriber managed by the DHCP application. You can use the **aggregate-clients** statement to extend the dynamic profile for all static subscribers to enable multiple subscribers to share the same VLAN logical interface.

You can specify that attributes (such as CoS or firewall) for the multiple subscribers are merged for the logical interface. That is, the profiles for multiple subscribers of different types are instantiated on the interface, but the profile attributes of each are merged together. Alternatively, you can specify that the instantiated profile for the current subscriber is replaced by the profile of a new subscriber that logs in using the same logical interface. This configuration can be overridden for a group of static subscribers when a different configuration is applied for that group.

To enable multiple subscribers to share the same VLAN logical interface for all static subscribers, do one of the following:

- Specify that the multiple subscriber attributes are merged for the logical interface.

```
[edit system services static-subscribers dynamic-profile dyn-profile-1]
user@host# set aggregate-clients merge
```

- Specify that the entire logical interface is replaced when a new subscriber logs into the network using the same VLAN logical interface.

  ```
  [edit system services static-subscribers dynamic-profile dyn-profile-3]
  user@host# set aggregate-clients replace
  ```

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259
- Specifying the Static Subscriber Group Dynamic Profile on page 267
- **dynamic-profile on page 859**

Configuring the Static Subscriber Global Authentication Password

You configure a password that is included in the Access-Request message sent to AAA to authenticate all static subscribers. This value can be overridden for a group of static subscribers when a different password is configured for that group.

To specify the authentication password used for all static subscribers:

- Specify the password.

  ```
  [edit system services static-subscribers authentication]
  user@host# set password Gj85*3mS
  ```

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259
- Configuring the Static Subscriber Group Authentication Password on page 268
- **authentication on page 792**

Configuring the Static Subscriber Global Username

You configure how the username is formed. The username serves as the username for all static subscribers that are created and is included in the Access-Request message sent to AAA to authenticate all static subscribers. This value can be overridden for a group of static subscribers when a different username is configured for that group.

The username must include at least one of the five possible elements. The value of each element is concatenated in a specific order; the resulting string is the username. If you specify their inclusion, the interface name, logical system name, and routing instance name are derived from the configuration context. The elements are ordered as follows:

user-prefix*.*interface*.*logical-system-name*.*routing-instance-name*@*domain-name

To configure the username for all static subscribers:

1. (Optional) Specify a prefix for the username.

   ```
   [edit system services static-subscribers authentication username-include]
   user@host# set user-prefix Building5
   ```

2. (Optional) Specify that the interface name is included in the username.

```
[edit system services static-subscribers authentication username-include]
user@host# set interface
```

3. (Optional) Specify that the logical system name is included in the username.

```
[edit system services static-subscribers authentication username-include]
user@host# set logical-system-name
```

4. Specify that the routing instance name is included in the username.

```
[edit system services static-subscribers authentication username-include]
user@host# set routing-instance-name
```

5. Specify the domain name included in the username.

```
[edit system services static-subscribers authentication username-include]
user@host# set domain-name campus.example.com
```

Configured in the default logical system and master routing instance for interface ge-0/1/1.100, this sample configuration generates the following username:

Building5.ge-0-1-1-100.default.master.campus.example.com

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259
- Configuring the Static Subscriber Group Username on page 269
- **username-include on page 1172**

Creating a Static Subscriber Group

You can override the configuration that is applied globally to static subscribers by creating a static subscriber group that consists of a set of statically configured interfaces. You can then apply a common configuration for the group with values different from the global values for access and dynamic profiles, password, and username.

To configure an interface group for static subscribers:

1. Access the **[edit system services static-subscribers]** hierarchy level.
2. Create the group and assign the name.

```
[edit system services static-subscribers]
user@host# edit group boston
```

3. Specify the names of one or more interfaces on which static subscribers can be created. You can repeat the **interface** ***interface-name*** statement to specify multiple interfaces within the group, but you cannot use the same interface in more than one group.

```
[edit system services static-subscribers group boston]
user@host# set interface ge-1/0/1.1
user@host# set interface ge-1/0/1.2
```

4. (Optional) You can use the **upto** ***upto-interface-name*** option to specify a range of interfaces for a group.

```
[edit system services static-subscribers group boston]
user@host# set interface ge-1/0/1.3 upto ge-1/0/1.9
```

5. (Optional) You can use the **exclude** option to exclude a specific interface or a specified range of interfaces from the group. For example:

```
[edit system services static-subscribers group boston]
user@host# interface ge-1/0/1.1 upto ge-1/0/1.102
user@host# interface ge-1/0/1.6 exclude
user@host# interface ge-1/0/1.70 upto ge-1/0/1.80 exclude
```

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259
- Specifying the Static Subscriber Group Access Profile on page 267
- Specifying the Static Subscriber Group Dynamic Profile on page 267
- Configuring the Static Subscriber Group Authentication Password on page 268
- Configuring the Static Subscriber Group Username on page 269

Specifying the Static Subscriber Group Access Profile

You can override the configured global access profile by specifying a different profile for a group of static subscribers. The access profile triggers AAA services for that group of static subscribers.

To specify the access profile used for a group of static subscribers:

- Specify the profile name.

```
[edit system services static-subscribers group boston]
user@host# set access-profile boston-acs
```

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259
- **profile on page 1039**

Specifying the Static Subscriber Group Dynamic Profile

You can override the configured global dynamic profile by specifying a different profile for a group of static subscribers. The dynamic profile is instantiated when any static subscriber in the group logs in.

To specify the dynamic profile used for a group of static subscribers:

- Specify the profile name.

```
[edit system services static-subscribers group boston]
user@host# set dynamic-profile dyn-profile-2
```

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259
- Specifying the Static Subscriber Global Dynamic Profile on page 264
- **dynamic-profiles on page 860**

Enabling Multiple Subscribers on a VLAN Logical Interface for a Static Subscriber Group

For a given interface, only a single static subscriber group (or static subscriber) is logged in. Although we do not recommend this practice, you might have other kinds of subscribers configured on the same interface, such as a DHCP subscriber managed by the DHCP application. You can use the **aggregate-clients** statement to extend the dynamic profile for a static subscriber group to enable multiple subscribers to share the same VLAN logical interface.

You can specify that attributes (such as CoS or firewall) for the multiple subscribers are merged for the logical interface. That is, the profiles for multiple subscribers of different types are instantiated on the interface, but the profile attributes of each are merged together. Alternatively, you can specify that the instantiated profile for the current subscriber group is replaced by the profile of a new subscriber that logs in using the same logical interface. This configuration overrides the configuration applied to all static subscribers that are not members of the group.

You can specify that attributes (such as CoS or firewall) for the multiple subscribers are merged for the logical interface. Alternatively, you can specify that the logical interface is replaced when a new subscriber logs in using the same logical interface. This configuration overrides the configuration applied to all static subscribers that are not members of the group.

To enable multiple subscribers to share the same VLAN logical interface for a static subscriber group, do one of the following:

- Specify that the multiple subscriber attributes are merged for the logical interface.

  [edit system services static-subscribers group boston dynamic-profile dyn-profile-2]
  user@host# set aggregate-clients merge

- Specify that the entire logical interface is replaced when a new subscriber logs into the network using the same VLAN logical interface.

  [edit system services static-subscribers group boston dynamic-profile dyn-profile-4]
  user@host# set aggregate-clients replace

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259
- Specifying the Static Subscriber Group Dynamic Profile on page 267
- **dynamic-profile on page 859**

Configuring the Static Subscriber Group Authentication Password

You can override the configured global authentication password by specifying a different password for a group of static subscribers. This password is included in the Access-Request message sent to AAA to authenticate all static subscribers in the group.

To specify the authentication password used for a group of static subscribers:

- Specify the password.

```
[edit system services static-subscribers group boston authentication]
user@host# set password knTS$$k2
```

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259
- Configuring the Static Subscriber Global Authentication Password on page 265
- **authentication on page 792**

Configuring the Static Subscriber Group Username

You can override the configured global username by specifying a different username for a group of static subscribers. The username serves as the username for a group of static subscribers that is created and is included in the Access-Request message sent to AAA to authenticate that group.

The username must include at least one of the five possible elements. The value of each element is concatenated in a specific order; the resulting string is the username. If you specify their inclusion, the interface name, logical system name, and routing instance name are derived from the configuration context. The elements are ordered as follows:

user-prefix*.interface.*logical-system-name*.*routing-instance-name*@*domain-name

To configure the username for a group of static subscribers:

1. (Optional) Specify a prefix for the username.

   ```
   [edit system services static-subscribers group boston authentication username-include]
   user@host# set user-prefix 2ndFloor
   ```

2. (Optional) Specify that the interface name is included in the username.

   ```
   [edit system services static-subscribers group boston authentication username-include]
   user@host# set interface
   ```

3. (Optional) Specify that the logical system name is included in the username.

   ```
   [edit system services static-subscribers group boston authentication username-include]
   user@host# set logical-system-name
   ```

4. Specify that the routing instance name is included in the username.

   ```
   [edit system services static-subscribers group boston authentication username-include]
   user@host# set routing-instance-name
   ```

5. Specify the domain name included in the username.

   ```
   [edit system services static-subscribers group boston authentication username-include]
   user@host# set domain-name building5.example.com
   ```

Configured in the default logical system and master routing instance for interface ge-0/1/2.50, this sample configuration generates the following username:

2ndfloor.ge-0-1-2-50.default.master.building5.example.com

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259

- Configuring the Static Subscriber Global Username on page 265
- **username-include on page 1172**

Forcing a Static Subscriber to Be Logged Out

You can force a static subscriber to be logged out on an interface. After you do so, no subscriber can subsequently log in on that interface until the interface state is reset either by a router reset or by entering the **request services static-subscribers login interface** command.

- To forcibly log out a static subscriber on a static interface:

  user@host> **request services static-subscribers logout interface ge-2/0/1.5**

Related Documentation

- Resetting the State of an Interface for Static Subscriber Login on page 270

Resetting the State of an Interface for Static Subscriber Login

When a static subscriber has been forcibly logged out on an interface with the **request services static-subscribers logout interface** command, you can reset the state of the interface. This action enables a static subscriber to log in on the interface. If you do not reset the state manually, then no static subscribers can log in on the interface until the state is reset by a router reset.

- To reset the state of a static interface:

  user@host> **request services static-subscribers login interface ge-2/0/1.5**

Related Documentation

- Forcing a Static Subscriber to Be Logged Out on page 270

Forcing a Group of Static Subscribers to Be Logged Out

You can force the static subscribes on all interfaces in a group to be logged out. After you do so, no subscriber can subsequently log in on an interface in that group until the interface state is reset either by a router reset or by entering the **request services static-subscribers login group** command.

- To forcibly log out all static subscribers on a static interface group:

  user@host> **request services static-subscribers logout group boston**

Related Documentation

- Resetting the State of an Interface Group for Static Subscriber Login on page 271

Resetting the State of an Interface Group for Static Subscriber Login

When static subscribers have been forcibly logged out on an interface group with the **request services static-subscribers logout group** command, you can reset the state of the group. This action enables static subscribers to log in on the interfaces in the group. If you do not reset the state manually, then no static subscribers can log in on any interface in the group until the state is reset by a router reset.

- To reset the state of a static interface group:

  user@host> **request services static-subscribers login group boston**

Related Documentation

- Forcing a Group of Static Subscribers to Be Logged Out on page 270

CHAPTER 24

Static Subscribers for Subscriber Access Examples

Example: Configuring Static Subscribers for Subscriber Access

This example shows a static subscriber configuration.

1. Configure the access profile to be used for static subscribers.

```
access {
  profile access5 {
    provisioning-order jsrc;
    accounting {
      order radius;
    }
    authentication {
      order radius;
    }
  }
}
```

2. Configure the dynamic profile to be used for static subscribers.

   If you do not configure this profile, the default profile, junos-default-profile, is used

3. Configure the static interfaces on which to layer the static subscribers.

4. Configure the parameters that apply globally to all static subscribers in the configuration context.

```
static-subscribers {
  access-profile access5;
  dynamic-profile dyn-profile-1;
  authentication {
    password Gj85*3mS;
    username-include {
      user-prefix Building5;
      interface;
      logical-system-name;
      routing-instance-name;
      domain-name example.com;
    }
```

```
    }
}
```

5. If you want to override the global parameters for certain static subscribers, create a group of static interfaces for those subscribers and configure parameters to apply to that group. Repeat this step for as many groups as you need.

```
static-subscribers {
  group boston {
    interface ge-1/0/1.1 upto ge-1/0/1.102
    interface ge-1/0/1.6 exclude
    interface ge-1/0/1.70 upto ge-1/0/1.80 exclude
    access-profile boston-acs;
    dynamic-profile dyn-profile-2;
    authentication {
      password knTS$$k2;
      username-include {
        user-prefix 2ndFloor;
        interface;
        logical-system-name;
        routing-instance-name;
        domain-name example.net;
      }
    }
  }
}
```

6. Configure tracing options for static subscriber events.

```
static-subscribers {
  traceoptions {
    file filename <files number> <match regular-expression > <size maximum-file-size>
      <world-readable | no-world-readable>;
    flag flag;
    level (all | error | info | notice | verbose | warning);
    no-remote-trace;
  }
}
```

CHAPTER 25

PTSP and Juniper Networks Session and Resource Control (SRC)

PTSP Overview

The packet-triggered subscribers and policy control (PTSP) feature allows the application of policies to individual source IP addresses flowing through a given interface. A subscriber context is created for each distinct source IP address seen in a given underlying interface. This feature can be used to support dynamic subscribers that are controlled by a subscriber termination device, such as a B-RAS or GGSN device, that is connected to an MX Series Ethernet Services Router.

PTSP has the following responsibilities:

- Create a subscriber context for each distinct IPv4 address on a given interface (subscriber context).
- Apply policies to or remove policies from the subscriber context.
- Collect statistics and report for each individual policy for each subscriber context.
- Derive information about subscribers.

You can associate specific subscriber contexts based on IPv4 addresses and provide service activation and deactivation for these subscribers. The Multiservices DPC (MS-DPC) maintains a table of addresses for each subscriber and any corresponding policies. If an address is not found in the subscriber table, then a new subscriber context is created. All policies are defined on a per-subscriber basis. Once the subscribers are present in the subscriber table, PSTP enforces the policies active for the subscriber context. PTSP can report the subscribers to the SAE using the Diameter protocol so that the SRC software can manage the subscribers and services with dynamic policies. You can also configure static policies, but dynamic policies take precedence over static policies. When you download a new dynamic policy, it takes effect only for new flows. All new flows and TCP connections use the new dynamic policy. Existing flows are not affected by the new policy unless they timeout, after which they are considered a new flow.

Statistics collection that is aggregated on a service rule basis is also shared with the SAE using the Diameter application. These statistics are not written to a flat file. Statistics collection that is aggregated on an application or application group basis is written to a flat file. These statistics are not shared with the SAE using the Diameter protocol.

Hardware Requirements for PTSP for Subscriber Access

PTSP is supported on Juniper Networks MX Series Ethernet Services Routers. You must have a Multiservices DPC (MS-DPC) on the MX Series router.

Related Documentation

- Configuring PTSP on page 289

Juniper Networks Session and Resource Control (SRC) and PTSP Overview

The Juniper Networks Session and Resource Control (SRC) environment provides a central administrative point for managing subscribers and their services. The SRC software runs on Juniper Networks C Series Controllers. The SRC software uses the Diameter protocol for communications between the local peer on a Juniper Networks routing platform and the remote SRC peer on a C Series Controller. The local peer is known as PTSP and is part of the AAA application. The remote SRC peer is the service activation engine (SAE); the SAE acts as the controlling agent in the SRC environment.

The SRC software enables the SAE to activate and deactivate subscriber services (described by SRC policies). The SAE installs or removes policies using a service rule policy template called **__svc_rule__**. This policy template indicates which policy is applied to a new subscriber session. Additional policies are bound to new sessions; they do not affect existing sessions. Note that policy name must be unique between PPR requests. You can use the same rule name within a single request, but you cannot use the same name again in a separate request.

Statistics collection that is aggregated on a service rule basis is also shared with the SAE using the Diameter protocol.

Diameter Messages Exchanged by PTSP and the SAE

The PTSP application is a Juniper Networks Diameter application registered with the IANA (http://www.iana.org) as Juniper JGx, with an ID of 16777273. PTSP and the SAE communicate by exchanging the Diameter messages described in Table 34 on page 276.

Table 34: Diameter Messages Used by PTSP and the SAE

Diameter Message	Code	Description
AA-Request (AAR)	265	Request from PTSP to the SAE at new subscriber login or during SAE-PTSP synchronization. The request can be one of three types: address-authorization, provisioning-request, or synchronization.
AA-Answer (AAA)	265	Response from the SAE to the PTSP AA-Request message.
Accounting-Request (ACR)	271	Request from the SAE to PTSP or from PTSP to the SAE for statistics.

Table 34: Diameter Messages Used by PTSP and the SAE *(continued)*

Diameter Message	Code	Description
Accounting-Answer (ACA)	271	Response to the ACR message to provide statistics for each installed policy.
Abort-Session-Request (ASR)	274	Request from the SAE to PTSP to log out a subscriber.
Abort-Session-Answer (ASA)	274	Response from PTSP to the SAE ASR message. Includes success or failure notification for the logout request.
Push-Profile-Request (PPR)	288	Request from the SAE to PTSP to activate or deactivate services for a subscriber.
Push-Profile-Answer (PPA)	288	Response from PTSP to the SAE PPR message. Includes success or failure notification for the service activation or deactivation commands in the request.
Session-Resource-Query (SRQ)	277	Request from PTSP to the SAE or from the SAE to PTSP to initiate synchronization between PTSP and the SAE.
Session-Resource-Reply (SRR)	277	Response to the SRQ message to begin synchronization.
Session-Termination-Request (STR)	275	Notification from PTSP to the SAE that a provisioned subscriber has logged out.
Session-Termination-Answer (STA)	275	Response from the SAE to the PTSP STR message. Includes success or failure notification.

Understanding Diameter AVPs for PTSP

Diameter conveys information by including various attribute-value pairs (AVPs) in Diameter messages. Table 35 on page 277 lists the standard Diameter AVPs used in PTSP interactions.

Table 35: Standard Diameter AVPs for PTSP

Code Number	Diameter AVP	Description	Type
263	Session-Id	Specifies the subscriber session identifier. For a packet-triggered subscriber managed by AAA, the value is assigned by PTSP to uniquely identify the subscriber session.	UTF8String

Table 35: Standard Diameter AVPs for PTSP *(continued)*

Code Number	Diameter AVP	Description	Type
268	Result-Code	Indicates whether a request completed successfully. Provides an error code if the request failed. The following classes are recognized by Diameter: • 1xxx—Informational • 2xxx—Success • 3xxx—Protocol errors • 4xxx—Transient errors • 5xxx—Permanent failures Unrecognized classes, which begin with numerals 6–9 or 0, are handled as permanent failures. PTSP supports the following values; all non-success values are treated as permanent failures: • 1001—DIAMETER_MULTI_ROUND_AUTH • 2001—DIAMETER_SUCCESS • 5002—DIAMETER_UNKNOWN_SESSION_ID • 5012—DIAMETER_UNABLE_TO_COMPLY	Unsigned32
277	Auth-Session-State	Indicates whether AAA session state is maintained. • 0—STATE_MAINTAINED • 1—NO_STATE_MAINTAINED	Enumerated
295	Termination-Cause	Indicates the reason why a session was terminated on the access device. • 1—DIAMETER_LOGOUT • 2—DIAMETER_SERVICE_NOT_PROVIDED • 3—DIAMETER_BAD_ANSWER • 4—DIAMETER_ADMINISTRATIVE • 5—DIAMETER_LINK_BROKEN • 6—DIAMETER_AUTH_EXPIRED • 7— DIAMETER_USER_MOVED • 8—DIAMETER_SESSION_TIMEOUT	Enumerated

Juniper Networks AVPs are used in addition to the standard Diameter AVPs. These AVPs have an enterprise number of 2636. Table 36 on page 278 lists the Juniper Networks AVPs used in PTSP interactions.

Table 36: Juniper Networks Diameter AVPs

Code Number	Diameter AVP	Description	Type
2020	Juniper-Policy-Install	Specifies policies to be activated for the subscriber. Includes Juniper-Policy-Name and Juniper-Policy-Definition.	Grouped

Table 36: Juniper Networks Diameter AVPs *(continued)*

Code Number	Diameter AVP	Description	Type
2021	Juniper-Policy-Name	Defines the name of a policy decision.	OctetString
2022	Juniper-Policy-Definition	Defines a policy decision. Includes Juniper-Policy-Name, Juniper-Template-Name, and Juniper-Substitution.	Grouped
2023	Juniper-Template-Name	Profile name defined by the router. PTSP only supports the **__svc_rule__** policy template.	UTF8String
2024	Juniper-Substitution	Defines the substitution attributes. Includes Juniper-Substitution-Name and Juniper-Substitution-Value.	OctetString
2025	Juniper-Substitution-Name	Defines the name of the variable to be replaced.	OctetString
2026	Juniper-Substitution-Value	Defines the value of the variable to be replaced.	OctetString
2027	Juniper-Policy-Remove	Specifies policies to be deactivated for the subscriber. Includes Juniper-Policy-Name.	Grouped
2035	Juniper-Policy-Failed	Specifies the name of the policy activation or deactivation that failed.	OctetString
2038	Juniper-Policy-Success	Specifies the name of the policy activation or deactivation that succeeded.	OctetString
2046	Juniper-Logical-System	Specifies the logical system.	UTF8String
2047	Juniper-Routing-Instance	Specifies the routing instance.	UTF8String
2048	Juniper-Jsrc-Partition	Specifies the logical system and routing instance for the subscriber or request. Includes Juniper-Logical-System and Juniper-Routing-Instance.	Grouped
2050	Juniper-Request-Type	Describes the type of request: • 1—ADDRESS_AUTHORIZATION • 2—PROVISIONING_REQUEST • 3—SYNCHRONIZATION	Enumerated
2051	Juniper-Synchronization-Type	Describes the type of synchronization: • 1—FULL-SYNC • 2—FAST-SYNC • 3—NO-STATE-TO-SYNC	Enumerated
2052	Juniper-Synchronization	Describes the state of synchronization: • 1—NO-SYNC; this is the default state • 2—SYNC-IN-PROGRESS • 3—SYNC-COMPLETE	Enumerated

Table 36: Juniper Networks Diameter AVPs *(continued)*

Code Number	Diameter AVP	Description	Type
2053	Juniper-Acct-Record	Statistics data for each policy installed for this subscriber. Includes Juniper-Policy-Name.	Grouped

Understanding PTSP-SAE Interactions

This topic describes the sequences of Diameter messages exchanged between PTSP and the SAE as they interact to perform the following tasks for subscriber access:

- Subscriber login

  When a packet-triggered subscriber logs in, PTSP sends a Diameter AA-Request message to request service provisioning from the SAE that includes the Session-Id attribute for the new subscriber. If the AA-Request fails, then the subscriber is not considered logged in and the subscriber session is not managed by the SAE. Only the static PTSP rules apply to the subscriber.

  The SAE returns a Diameter AA-Answer message with the Result-Code. The AA-Answer message can include the Juniper-Policy-Install AVP (AVP code 2020), which is used to specify a service to attach to the subscriber's IP address.

  PTSP can send an AA-Request message to the SAE to confirm activation. The SAE returns a AA-Answer message in acknowledgment. If the AA-Request message fails or the SAE does not respond with an AA-Answer message, the subscriber session is managed by the SAE.

- Service activation and deactivation

  The SAE policies provision subscriber services. After a packet-triggered subscriber is logged in, the SAE can send a PPR message to PTSP to activate or deactivate services. A given PPR can include the Juniper-Policy-Install AVP (AVP code 2020) to activate a service or the Juniper-Policy-Remove AVP (AVP code 2027) to deactivate a service.

  PTSP sends a PPA message to the SAE when it has completed the tasks requested in the PPR. The PPA indicates the success or failure of the actions requested in the PPR.

- Resynchronization

  Either PTSP or the SAE initiates the resynchronization.

  The SAE initiates resynchronization at startup or when a backup SAE takes over session control due to resource limits or conditions on the primary SAE. The SAE clears its database of all entries in preparation for the synchronization.

  PTSP initiates resynchronization at startup, such as when AAA starts or restarts. PTSP uses the Juniper-Last-Origin-Host AVP (AVP code 2055) to keep track of the active SAE host in a multi-SAE environment. When an SAE in a multi-SAE environment becomes active, it must send an SRQ to PTSP as its first message. PTSP initiates a synchronization when it receives any other message type from an SAE that is different from the SAE indicated in the Juniper-Last-Origin-Host AVP.

  Both entities initiate a resynchronization by sending an SRQ message. The recipient responds with an SRR message.

- Statistics collection and reporting per service rule

  Statistics information can be sent from the router to the SAE or from the SAE to the router. Both the Diameter Accounting-Request and Accounting-Answer messages include the Juniper-Acct-Record AVP (AVP code 2053) which identifies the policy for which accounting information is requested.

- Subscriber logout

  PTSP can determine when there is a logout request for a packet-triggered subscriber in two ways:

  - The SAE terminates a subscriber session by sending an ASR message to PTSP.
  - PTSP monitors a subscriber session and starts the logout process after 30 minutes of inactivity.

  The subscriber logout triggers the final statistics aggregation for all policies and the removal of any policies installed by the SAE. PTSP sends an STR message that indicates the logout event to the SAE.

Related Documentation

- Configuring the PTSP Application on page 283
- Configuring PTSP on page 289

Packet-Triggered Subscribers Services Overview

The packet-triggered subscribers and policy control (PTSP) feature allows the application of policies to dynamic subscribers that are controlled by a subscriber termination device. You can associate specific subscriber contexts based on IPv4 addresses and provide dynamic service activation and deactivation for these subscribers. Once the subscribers are present in the subscriber database on the router, PSTP can report the subscribers to the SAE using the PTSP application so that the SRC software can manage the subscribers and services.

PTSP policies can be downloaded dynamically from the external policy manager (such as SRC) or configured statically on the router. The PTSP policies can be configured for each distinct IPv4 source address for a given interface on which the service is configured. Each distinct IPv4 address is considered a subscriber and all PTSP policies are applied on a per-subscriber basis. Dynamic policies, which are always specific to a subscriber, take precedence over static policies.

You can set up PTSP policies to:

- Manage traffic by configuring filtering, rate-limiting, and QoS enforcement in the rules.
- Steer traffic by specifying the forwarding instance in the forward rule.
- Collect accounting information by service rule or by application.

When you configure PTSP policies, you must specify the type of statistics collection (**count**) and the IP address used to identify the packet-triggered subscriber (**demux**) in

the service rule. All service rules attached to a given service set must have the same settings for these options.

For the statistics collection type, terms and rules also cannot mix and match the following styles:

- rule—Statistics are aggregated in one bucket for the service rule and Diameter is used to report the statistics.
- application—Statistics are aggregated by application for a specific application, for a specific application group, or in one bucket. The statistics are reported in a flat file.

Subscriber instantiation is triggered for ingress packets by the IP address. When source address is specified, the source IP address of the ingress packets is used to establish the subscriber context. When destination address is specified, the destination IP address of the ingress packets is used to establish the subscriber context. If the IP address does not correspond to a known subscriber, then a new subscriber context is created to log in the packet-triggered subscriber.

The match conditions include local address, local port, remote address, and remote port. The following table describes how the **demux** value changes the IP address or port used for these terms.

Match Conditions	demux source-address		demux destination-address	
	Ingress Flows	Egress Flows	Ingress Flows	Egress Flows
local-address	Source address	Destination address	Destination address	Source address
remote-address	Destination address	Source address	Source address	Destination address
local-port	Source port	Destination port	Destination port	Source port
remote-port	Destination port	Source port	Source port	Destination port

Related Documentation

- Configuring PTSP on page 289
- Configuring Static PTSP Rules on page 291

CHAPTER 26

Configuring the PTSP Application

Configuring the PTSP Application

You can configure the PTSP client application to work with the Session and Resource Control (SRC) peer to centrally manage packet-triggered subscribers and services. PTSP requests address and service authorizations from the remote SRC peer (the SAE), activates and deactivates services as specified by the SAE, logs out subscribers as specified by the SAE, and synchronizes subscriber state and service information with the SAE. The PTSP application also performs statistics collection and reporting.

To configure the PTSP application:

1. Configure the PTSP partition.

   See “Configuring the PTSP Partition” on page 284.

2. Assign the PTSP partition.

   See “Assigning the PTSP Partition” on page 284.

3. Configure statistics collection and reporting.

   See “Tracing Packet-Triggered Subscriber Operations” on page 285.

Related Documentation

- Juniper Networks Session and Resource Control (SRC) and PTSP Overview on page 276

Configuring the PTSP Partition

PTSP works within a specific logical system:routing instance context, called a partition. The partition is configured to connect to the external policy manager.

NOTE: Currently, only a single partition is supported; you must configure it within the default logical system:routing instance context.

Before you configure the PTSP partition to connect to the external policy manager, perform the following task:

- Configure the Diameter instance for the remote SRC peer at the **[edit diameter]** hierarchy level. See "Configuring Diameter" on page 233.

Configuration for the PTSP partition consists of naming the partition and then associating a Diameter instance, the SAE hostname, and the SAE realm with the partition.

To configure the PTSP partition:

1. Create the partition at the **[edit system services packet-triggered-subscribers]** hierarchy level.

   ```
   [edit system services packet-triggered-subscribers]
   user@host# edit partition ptsp–default
   ```

2. Specify the Diameter instance for the PTSP partition.

   ```
   [edit system services packet-triggered-subscribers partition ptsp–default]
   user@host# set diameter-instance master
   ```

3. Configure the destination host for the PTSP partition.

   ```
   [edit system services packet-triggered-subscribers partition ptsp–default]
   user@host# set destination-host sae1
   ```

4. Configure the destination realm for the PTSP partition.

   ```
   [edit system services packet-triggered-subscribers partition ptsp–default]
   user@host# set destination-realm generic.example.com
   ```

Related Documentation

- Configuring the PTSP Application on page 283

Assigning the PTSP Partition

You must associate the PTSP partition with the logical system:routing instance.

NOTE: Currently, only the global logical system:routing instance, *master* logical system and default routing instance, is supported.

Before you assign the PTSP partition, perform the following task:

- Configure the PTSP partition. See “Configuring the PTSP Partition” on page 284.

To assign the PTSP partition:

- Specify the partition name at the **[edit system]** hierarchy level.

```
[edit system]
user@host# set packet-triggered-subscribers-partition ptsp–default
```

Related Documentation

- Configuring the PTSP Application on page 283

Tracing Packet-Triggered Subscriber Operations

Packet-triggered subscriber tracing operations track packet-triggered subscriber 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 (**/var/log**) 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 so on. When the maximum number of trace files is reached, the oldest trace file is overwritten.

To configure packet-triggered subscriber tracing operations:

1. Specify that you want to configure tracing options.

```
[edit system services packet-triggered-subscribers]
user@host# edit traceoptions
```

2. (Optional) Configure the name for the file used for the trace output.
3. (Optional) Configure the number and size of the log files.
4. (Optional) Configure flags to filter the operations to be logged.

The packet-triggered subscriber traceoptions operations are described in the following sections:

- Configuring the Packet-Triggered Subscribers Trace Log Filename on page 285
- Configuring the Size of Packet-Triggered Subscribers Log Files on page 286
- Configuring the Packet-Triggered Subscribers Tracing Flags on page 286

Configuring the Packet-Triggered Subscribers Trace Log Filename

By default, the name of the file that records trace output for packet-triggered subscribers is **jptspd**. You can specify a different name with the **file** option.

To configure the filename for packet-triggered subscribers tracing operations:

- Specify the name of the file used for the trace output.

```
[edit system services packet-triggered-subscribers traceoptions]
```

```
user@host# set file ptsp-subs_1
```

Configuring the Size of Packet-Triggered Subscribers Log Files

By default, when the trace file reaches 128 kilobytes (KB) in size, it is renamed ***filename*.0**, then ***filename*.1**, and so on, until there are three trace files. Then the oldest trace file (***filename*.2**) is overwritten.

You can optionally configure the maximum file size to be from 10 KB through 1 gigabyte (GB).

For example, you can set the maximum file size to 2 MB. When the file that receives the output of the tracing operation (***filename***) reaches 2 MB, ***filename*** is renamed ***filename*.0**, and a new file called ***filename*** is created. When the new ***filename*** reaches 2 MB, ***filename*.0** is renamed ***filename*.1** and ***filename*** is renamed ***filename*.0**. This process repeats until there are three trace files. Then the oldest file (***filename*.2**) is overwritten by the newest file (***filename*.0**).

To configure the size of trace files:

- Specify the name and size of the file used for the trace output.

  ```
  [edit system services packet-triggered-subscribers traceoptions]
  user@host# set file ptsp-subs_1 _logfile_1 size 2097152
  ```

Configuring the Packet-Triggered Subscribers Tracing Flags

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
configuration	Trace configuration events
general	Trace general flow
peer	Trace SRC peer events
pic	Trace PIC events
rtsock	Trace routing socket events
session	Trace session events

To configure the flags for the events to be logged:

- Configure the flags.

  ```
  [edit system services packet-triggered-subscribers traceoptions]
  ```

```
user@host# set flag peer
user@host# set flag session
```

Related Documentation

- Configuring the PTSP Application on page 283

CHAPTER 27

Configuring Packet-Triggered Subscriber Services

Configuring PTSP

You can configure the packet-triggered subscribers and policy control (PTSP) feature on MX Series routers to allow the application of policies to dynamic subscribers that are controlled by a subscriber termination device, such as a B-RAS or GGSN device, connected to an MX Series router. The subscribers are associated by their IPv4 address and dynamic or static policies can be applied. Dynamic policies take precedence over static policies. When you download a new dynamic policy, it takes effect only for new flows. All new flows and TCP connections use the new dynamic policy. Existing flows are not affected by the new policy unless they timeout, after which they are considered a new flow.

To configure PTSP services on the MX Series router:

1. Configure the Multiservices DPC.

   See “Configuring the Multiservices DPC for PTSP” on page 290.

2. Configure the Diameter application to support the download of dynamic PTSP policies from the external policy manager (such as SRC). The PTSP application also provides statistics collection and reporting.

   See “Configuring the PTSP Application” on page 283.

3. Configure the static PTSP service rules.

   See “Configuring Static PTSP Rules” on page 291.

4. Configure statistics collection and reporting in a flat file.

   See “Configuring a Statistics Profile for PTSP” on page 296 and “Tracing PTSP Operations” on page 298.

Related Documentation

- PTSP Overview on page 275

Configuring the Multiservices DPC for PTSP

To configure the Multiservices Dense Port Concentrator (MS-DPC) to support PTSP services, perform the following tasks:

- Enabling the PTSP Service Package on the Multiservices DPC on page 290
- Configuring Services Interface for PTSP on page 290

Enabling the PTSP Service Package on the Multiservices DPC

The PTSP feature runs on the Multiservices DPC, you must enable the PTSP service package on the Multiservices DPC before you can configure the PTSP software. The name of the PTSP service package is **jservices-ptsp**.

To enable the PTSP service package:

1. Determine the FPC slot number and the PIC number of the MS-DPC on which you want to enable the PTSP service package.

   ```
   user@host> show chassis hardware
   ```

   In this example, the FPC slot number is 3 and the PIC number is 0.

2. Enable the jservices-ptsp package on the Multiservices DPC.

   ```
   [edit chassis]
   user@host# set fpc 3 pic 0 adaptive-services service-package extension-provider
     package jservices-ptsp
   ```

Configuring Services Interface for PTSP

To configure the services interface for PTSP:

1. Enter edit mode for the interface.

   ```
   [edit]
   user@host# edit interfaces ms-3/0/0
   ```

2. Configure a logical unit and specify the protocol family.

   ```
   [edit interfaces ms-3/0/0]
   user@host# set unit 0 family inet
   ```

Related Documentation

- Configuring PTSP on page 289
- PTSP Overview on page 275

Configuring PTSP Service Rules

PTSP policies can be downloaded dynamically from the external policy manager (such as SRC) or configured statically on the router. The PTSP policies can be configured for each distinct IPv4 source address for a given interface on which the service is configured. Each distinct IPv4 address is considered a subscriber and all PTSP policies are applied on a per-subscriber basis.

Dynamic policies, which are always specific to a subscriber, take precedence over static policies. When you download a new dynamic policy, it takes effect only for new flows. All new flows and TCP connections use the new dynamic policy. Existing flows are not affected by the new policy unless they timeout, after which they are considered a new flow.

To configure the PTSP policies, perform these tasks:

- To download dynamic policies and to collect statistics with Diameter, configure the Diameter application for PTSP. See “Configuring the PTSP Application” on page 283.
- To configure static policies, see “Configuring Static PTSP Rules” on page 291. To collect statistics in a flat file, see “Configuring a Statistics Profile for PTSP” on page 296.

Related Documentation

- Configuring PTSP on page 289
- PTSP Overview on page 275

Configuring Static PTSP Rules

You can configure the static PTSP policies on the router. If the PTSP service is configured on the underlying interface, the PTSP service enforces the policies associated with the subscriber context.

To configure static PTSP rules:

1. Specify the rule that you want to configure.

   ```
   [edit services ptsp]
   user@host# edit rule ptspRule1
   ```

2. Specify the direction in which the rule match is applied.

   ```
   [edit services ptsp rule ptspRule1]
   user@host# set match-direction input
   ```

3. Specify the IP address used for the subscriber context. Subscriber instantiation is always triggered for ingress packets, so this value indicates which IP address in the ingress packets for the flow is used.

   ```
   [edit services ptsp rule ptspRule1]
   ```

```
user@host# set demux source-address
```

4. Specify the statistics aggregation, collection, and reporting style. Terms and rules cannot mix and match different styles.

```
[edit services ptsp rule ptspRule1]
user@host# set count-type rule
```

If you specify the rule style, statistics collection is performed by the Diameter application. If you specify the application style, statistics collection is in a flat file controlled by the local policy decision function (L-PDF).

5. (Optional) Specify the forward rule used for forwarding packets. See "Configuring the PTSP Forwarding Instance" on page 294.

```
[edit services ptsp rule ptspRule1]
user@host# set forward-rule forward-rule-name
```

6. Configure the term precedence for the rule.

```
[edit services ptsp rule ptspRule1]
user@host# edit term 1
```

7. Configure the match conditions for the term. See Table 37 on page 292.

```
[edit services ptsp rule ptspRule1 term 1]
user@host# set from remote-address-range low 203.0.0.2 high 203.0.0.100
user@host# set from remote-address-range low 204.0.0.2 high 204.0.0.253
```

8. (Optional) Specify the action taken when the match conditions are met. See Table 38 on page 293.

```
[edit services ptsp rule ptspRule1 term 1]
user@host# set then count rule
user@host# set then accept
```

Table 37 on page 292 describes the match conditions for PTSP rules.

Table 37: PTSP Match Conditions

Match Condition	Description
application-group-any	Application group name defined in the application identification configuration.
application-groups [*application-group-name*]	Application group name defined in the application identification configuration.
applications	Application name defined in the application identification configuration.
local-port-range low *low-value* **high** *high-value*	Local port range.
local-ports *value-list*	Local ports.
protocol *protocol-number*	IP protocol number.
remote-address (*address* **| any-unicast)**	Remote IP address. IPv4 only.

Table 37: PTSP Match Conditions *(continued)*

Match Condition	Description
remote-address-range low *low-value* **high** *low-value*	Remote address range. IPv4 only.
remote-port-range low *low-value* **high** *high-value*	Remote port range.
remote-ports *value-list*	Remote ports.
remote-prefix-list *prefix-list-name*	Prefixes in the specified list.

Table 38 on page 293 describes the actions for PTSP rules.

Table 38: PTSP Actions

Action or Action Modifier	Description
accept	Accept the packet.
count	Increment the specified counter.
discard	Drop the packet.
forwarding-class	Classify the packet into the specified forwarding class.
police	Rate-limit packets based on the specified policer.

Related Documentation

- Configuring the PTSP Forwarding Instance on page 294
- Configuring a Statistics Profile for PTSP on page 296
- Configuring PTSP on page 289
- PTSP Overview on page 275
- Packet-Triggered Subscribers Services Overview on page 281

Configuring PTSP Rule Sets

You can define a collection of PTSP rules to determine the actions performed on packets.

To configure static PTSP rule sets:

1. Specify the rule set that you want to configure.

   ```
   [edit services ptsp]
   user@host# edit rule-set ptspRules
   ```

2. Specify the rules in the order that you want them processed.

   ```
   [edit services ptsp rule-set ptspRules]
   ```

```
user@host# set rule ptspRule1
user@host# set rule ptspRule2
```

Related Documentation

- Configuring Static PTSP Rules on page 291

Configuring PTSP Service Sets

To configure the service set for the PTSP application:

1. Configure the service set that you want to contain the PTSP service.

   ```
   [edit services service-set ptspServiceSet]
   user@host# set service-set ptspServiceSet
   ```

2. Specify the PTSP rules that constitute the service set that is applied to the services interface.

   ```
   [edit services service-set ptspServiceSet]
   user@host# set ptsp-rules ptsp-rule1
   user@host# set ptsp-rules ptsp-rule2
   ```

3. Configure the services interface.

   ```
   [edit services service-set ptspServiceSet]
   user@host# set interface-service service-interface ms-3/0/0.0
   ```

4. Associate the service set with the underlying interface from which the subscribers originate. The service set must be applied to the interface facing the subscriber, that is, the interface with the IP address of the subscriber.

   ```
   [edit interfaces ge-4/0/0 unit 0 family inet service]
   user@host# set input service-set ptspServiceSet
   user@host# set output service-set ptspServiceSet
   ```

Related Documentation

- Configuring Static PTSP Rules on page 291
- Configuring PTSP Rule Sets on page 293

Configuring the PTSP Forwarding Instance

Before you can forward PTSP traffic, perform these tasks for each forwarding instance:

1. Configure each PTSP forwarding instance as a routing instance type of forwarding.
2. Configure a firewall filter with an action that specifies the routing instance configured in Step 1.
3. Configure the unit number for the Multiservices interface that specifies the filter configured in Step 2 as the input filter.

NOTE: To avoid service set dependency on specific unit numbers, use the same unit number across all Multiservices interfaces where PTSP services are applied.

4. Configure the PTSP forward rule to specify the forwarding instance.

NOTE: When the forwarding instance action is performed on the flow, any postservice filters are not applied to the underlying interface.

If you want to forward traffic for PTSP subscribers, you must specify the forwarding instance for specific subscribers based on IP address, network, or prefix list. The match direction for forward rules is always input.

To configure the PTSP forwarding instance:

1. Specify the PTSP forward rule that you want to use when configuring a PTSP forwarding instance.

   ```
   [edit services ptsp]
   user@host# edit forward-rule ptspForward
   ```

2. Set the term precedence for the forward rule. Term with lowest precedence is evaluated first.

   ```
   [edit services ptsp forward-rule ptspForward]
   user@host# edit term 5
   ```

3. Configure the match conditions for the IP address, address range, or prefix list. See Table 39 on page 295.

   ```
   [edit services ptsp forward-rule ptspForward term 5]
   user@host# set from local-address 200.0.0.1
   ```

Table 39: PTSP Forward Rule Match Conditions

Match Condition	Description
application-groups [*application-group-name*]	Application group name defined in the application identification configuration.
applications	Application name defined in the application identification configuration.
local-address (*address* | **any-unicast**)	Local IP address. IPv4 only.
local-address-range low *low-value* **high** *high-value*	Local address range. IPv4 only.
local-prefix-list *prefix-list-name*	Prefixes in the specified list.

NOTE: You can specify match conditions for applications or application groups that support application identification (APPID) services, but we do not recommend specifying the forwarding instance action when you are using these match conditions in PTSP policies. In this situation, some network topologies may route packets in a manner that causes the flow to be dropped. For example, the APPID services might forward some packets on the default routing instance while the PTSP services forward other packets in the same flow to another routing instance.

4. Configure the forwarding instance action with the routing instance name and the unit number.

```
[edit services ptsp forward-rule ptspForward term 5]
user@host# set then forwarding-instance less-effort-ri 144
```

NOTE: When the forwarding instance action is performed on the flow, any postservice filters are not applied to the underlying interface.

Related Documentation

- For information about APPID services, see the *Junos OS Services Interfaces Configuration Guide*
- For information about forwarding instances, see the *Junos OS Routing Protocols Configuration Guide*

Configuring a Statistics Profile for PTSP

The local policy decision function (L-PDF) enables you to configure properties for statistics output by creating a statistics profile. The statistics profile configures the files to which statistics records are exported and the format that is exported. You configure the statistics profile so that the statistics records are exported to a flat file. Flat files contain statistics that are collected for each subscriber by application or application group. The statistics in a flat file are not transmitted to the external policy manager using Diameter.

To configure a statistics profile for PTSP:

1. Specify that you want to configure a statistics profile.

```
[edit system services local-policy-decision-function]
user@host# edit statistics
```

2. Configure the file properties used for the trace output.
3. Configure the profile properties.
4. Specify the record type.

Tasks to configure a statistics profile for PTSP are:

- Configuring the File Properties for Statistics Data Output on page 297
- Configuring the Profile Properties for Statistics Data Output on page 297
- Configuring the Record Type for Statistics Data on page 298

Configuring the File Properties for Statistics Data Output

You configure a file to which the statistics data output is exported in a specified format.

To configure the file properties:

1. Specify the unique filename for receiving statistics data output.

   ```
   [edit system services local-policy-decision-function statistics]
   user@host# edit file ptsp
   ```

2. (Optional) Specify the maximum number of files that are maintained at one time and the maximum size of each file. If you configure one of these options, you also must set the other option.

   ```
   [edit system services local-policy-decision-function statistics file ptsp]
   user@host# set files 10 size 1g
   ```

3. Specify the interval for transferring files to archive sites.

   ```
   [edit system services local-policy-decision-function statistics file ptsp]
   user@host# set transfer-interval 60
   ```

4. Specify one or more URLs for archiving the files. Archiving can be done by using FTP or SCP.

   ```
   [edit system services local-policy-decision-function statistics file ptsp]
   user@host# set archive-sites "ftp://anonymous@10.227.1.114"
   ```

Configuring the Profile Properties for Statistics Data Output

You can create an AACL statistics profile, which configures the statistics to collect and write to a file in the **/var/stats/aacl** directory.

To configure the profile properties:

1. Specify the name of the profile.

   ```
   [edit system services local-policy-decision-function statistics]
   user@host# edit aacl-statistics-profile ptsp
   ```

2. (Optional) Specify the file in the **/var/stats/aacl** directory in which statistics are collected. Enclose the name within quotation marks.

   ```
   [edit system services local-policy-decision-function statistics aacl-statistics-profile
     ptsp]
   user@host# set file "pstp"
   ```

3. Set the interval for reporting statistics.

   ```
   [edit system services local-policy-decision-function statistics aacl-statistics-profile
     ptsp]
   user@host# set report-interval 5
   ```

4. Set the **interim-active-only** mode for reporting statistics. This mode reports only statistics that have changed in the past report interval.

   ```
   [edit system services local-policy-decision-function statistics aacl-statistics-profile
     ptsp]
   user@host# set report-mode interim-active-only
   ```

5. Specify the statistics to be collected in the log file.

   ```
   [edit system services local-policy-decision-function statistics aacl-statistics-profile
     ptsp]
   user@host# set aacl-fields all-fields
   ```

Configuring the Record Type for Statistics Data

You must configure the interim record type for recording the AACL statistics.

To configure the record type:

- Specify interim as the record type.

  ```
  [edit system services local-policy-decision-function statistics]
  user@host# set record-type interim
  ```

Related Documentation

- Tracing PTSP Operations on page 298

Tracing PTSP Operations

Tracing operations track L-PDF operations and record them in a log file. The error descriptions captured in the log file provide detailed information to help you solve problems.

By default, no events are traced. When you enable the tracing operation, the default tracing behavior is as follows:

1. Important events are logged in a file located in the **/var/log** directory. You cannot change the directory (**/var/log**) in which trace files are located.
2. When the trace file reaches its maximum size, a **.0** is appended to the filename, then a new file is created with a **.1** appended, and so on. When the maximum number of trace files is reached, the oldest trace file is overwritten.

   You can optionally configure the maximum file size to be from 10 KB through 1 gigabyte (GB). You can also specify the number of trace files to be from 2 through 1000. (For more information about how log files are created, see the *Junos OS System Log Messages Reference*.)

To customize trace file settings:

1. Specify that you want to configure tracing options.

   ```
   [edit system services local-policy-decision-function]
   user@host# edit traceoptions
   ```

2. Configure the filename used for the trace output.

```
[edit system services local-policy-decision-function traceoptions]
user@host# set file lpdfd
```

3. (Optional) Configure the maximum number and size of the log files. If you configure one of these options, you also must set the other option.

```
[edit system services local-policy-decision-function traceoptions]
user@host# set files 10 size 1g
```

4. (Optional) Specify flags to filter the operations to be logged. To specify more than one flag, include multiple **flag** statements.

```
[edit system services local-policy-decision-function traceoptions]
user@host# set flag ptsp-statistics
```

The following table describes the flags that you can include.

Flag	Description
configuration	Trace configuration events
database	Trace database events
general	Trace general flow
ptsp-statistics	Trace PTSP events
rtsock	Trace routing socket events
statistics	Trace statistics events
subscriber	Trace subscriber events

Related Documentation

- Configuring a Statistics Profile for PTSP on page 296

Verifying and Managing PTSP Configuration

Purpose Display and clear information about packet-triggered subscribers and PTSP services.

Action

- To display bandwidth information about subscribers:

  ```
  user@host> show services subscriber bandwidth
  ```

- To display information about the active dynamic policies applied to a subscriber:

  ```
  user@host> show services subscriber dynamic-policies client-id client-id
  ```

- To display information about the data flows associated with a subscriber:

  ```
  user@host> show services subscriber flows client-id client-id
  ```

- To display information about the active packet-triggered subscriber sessions on the router:

  ```
  user@host> show services subscriber sessions
  ```

- To display information about the data traffic statistics for the packet-triggered subscriber:

  user@host> **show services subscriber statistics client-id *client-id***

- To clear the active packet-triggered subscriber session on the router and log out the subscriber:

  user@host> **clear services subscriber sessions client-id *client-id***

Related Documentation

- For more information, see the *Junos OS System Basics and Services Command Reference*

PART 8

Mobile IP Access

CHAPTER 28

Mobile IP Overview

Mobile IP Home Agent Elements and Behavior

Mobile IP is a tunneling-based solution that enhances the utility of Junos routing platforms at the edge of the network between fixed wire and wireless network domains. This tunneling-based solution enables a router on a user's home subnet to intercept and forward IP packets to users who roam beyond traditional network boundaries. Mobile IP is useful in environments where mobility is desired and the traditional land line dial-in model does not provide an adequate solution, and in environments where a wireless technology is used.

You configure Mobile IP home agent parameters in the **[edit services mobile-ip]** hierarchy level, the **[edit logical-systems *logical-system-name*]** hierarchy level and the **[edit routing-instances *routing-instances-name*]** hierarchy level.

NOTE: Currently, Junos OS does not support configuration of the Mobile IP foreign agent.

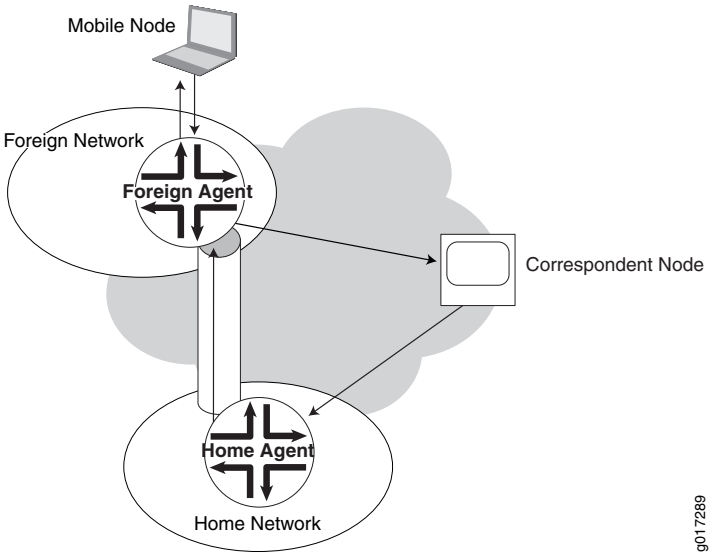
Traditionally, IP addresses are associated with a fixed network location. To achieve mobility, the mobile node assumes a secondary IP address that matches the new network and redirects the traffic bound to the primary or home address to the mobile node's new network. In the Mobile IP architecture, the two agents that accomplish this task are the home agent and the foreign agent.

When a mobile node roams into a new, foreign network, it negotiates with the foreign agent to get a secondary IP address, which is referred to as the care-of address. The mobile node registers this care-of address with the home agent. The home agent then establishes a tunnel to the care-of address if the tunnel is not established earlier.

NOTE: You need to establish only one tunnel between the home agent and the care-of address. Demultiplexing of the traffic is done through IP address inspection.

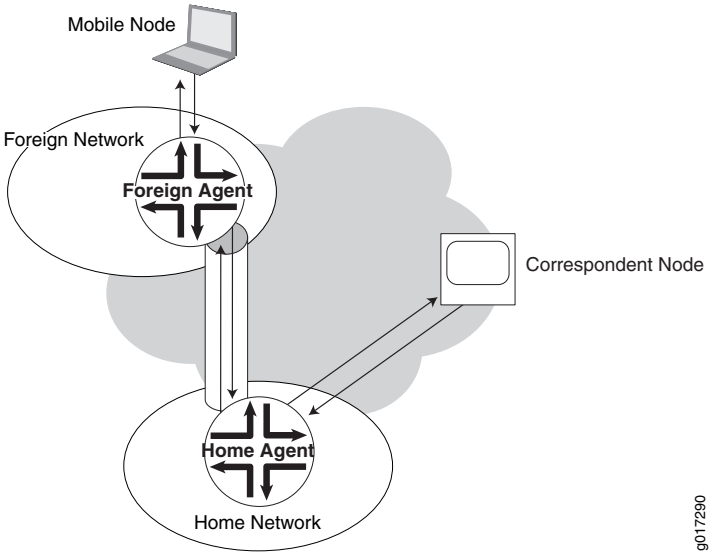
Packets sent to the home address of the mobile node are redirected by the home agent through the tunnel to the care-of address at the foreign agent. The foreign agent routes the packets to the mobile node's home address. Figure 6 on page 304 illustrates this forwarding and routing process behavior. Although the traffic to the correspondent node comes from the foreign agent, to the correspondent node the traffic appears to come from the mobile node's home network.

Figure 6: Mobile IP Network Without Reverse Tunneling



If the mobile node's home address is a private address or if the foreign agent implements ingress filtering, a reverse tunnel from the care-of address to the home agent is required. This reverse tunnel capability is negotiated between the foreign agent and the home agent when the mobile node requests registration. Traffic from a correspondent node to the mobile node is forwarded by the home agent through the foreign agent as in the other scenario. Figure 7 on page 305 shows how traffic from the mobile node to a correspondent node is tunneled from the foreign agent to the home agent and then routed to the correspondent node by the home agent.

Figure 7: Mobile IP Network with Reverse Tunneling



Mobile nodes typically belong to a virtual network, which is an address range or subnet that is not directly served by any physical, routed interface on the home network. These mobile nodes never return home to attach to a physical interface on the home agent. Traffic destined for the mobile node can be forwarded over any interface.

You can use the Mobile IP home agent feature to configure the home agent within the default router context with either local or AAA authentication. When you configure local authentication, you can also configure Mobile IP independently in any named routing instance in any configured logical router. When you configure AAA as the authentication method, you can configure Mobile IP only in the default router context.

The Mobile IP home agent can also receive, process, and send Worldwide Interoperability for Microwave Access (WiMAX) vendor-specific RADIUS attributes (VSAs). This feature enables Mobile IP home agent to work in a WiMAX home connectivity services network (H-CSN), to provide for mobility management at the IP layer.

The home agent handles the following tasks:

- Registration of mobile nodes
- Routing and forwarding of mobile node traffic

Related Documentation

- Mobile IP Registration on page 306
- Mobile IP Routing and Forwarding on page 310
- Mobile IP in the WiMAX Environment on page 311
- Configuring Mobile IP on page 315

Mobile IP Registration

The home agent receives the registration requests (RRQs) on UDP port 434. The registration request contains the home agent IP address. The home agent can support static home address allocation and dynamic home address allocation. The home agent can revoke a mobile node's registration. When this happens, the mobility binding is removed and the foreign agent is informed of the revocation so it can free up its resources. The foreign agent can send a registration revocation request to the home agent when the mobile node roams to another area. The revocation request can include a revocation support extension to indicate that it supports the revocation mechanism.

Home Address Assignment

The mobile node's home address can either be preconfigured, or dynamically allocated by the Mobile IP home agent. If a nonzero home address is preconfigured, the home agent processes the registration request using the home address and NAI (if the NAI is present).

If the home address is dynamically allocated, the mobile node submits a zero home address and requests the home agent to assign an IP address. The mobile node then uses the address provided by the home agent for subsequent registration requests, until the mobile node is rebooted or the registration expires.

Home address allocation is done by one of the existing authentication, authorization, and accounting (AAA) server back-end address mechanisms, such as:

- By RADIUS, in the Framed-IP-Address attribute
- From a local address pool returned by RADIUS in the Framed-Pool attribute

Authentication

The home agent authenticates the requests based on RFC 3344—IP Mobility Support for IPv4 (August 2002). By default, a AAA server is used for authentication; alternatively, you can configure local authentication parameters on the home agent. The mobile node authentication is verified and the authentication algorithm and key are retrieved by checking the security association indexed by the security parameter index (SPI) value. This verification results in the key and the authentication algorithm with which to compute an MD-5 message digest over the registration request. The Mobile IP home agent supports both HMAC-MD5 and keyed-MD5 authentication algorithms. When the result of this computation matches the authenticator, the mobile-home extension is authenticated. For local authentication, the key is limited to a maximum of 128 bits. For AAA authentication, the key can be longer depending on the maximum length configured on the AAA server.

When HA receives the access accept from the AAA, it extracts the MN-HA key from the response. The home agent does the MN-HA authentication extension processing based on the MN-HA key by running authentication algorithm (HMAC-MD5 or Keyed-MD5) on the message to compute a hash (authenticator), which is compared with the hash value in the MN-HA extension. If the hash value matches, the RRQ is considered authenticated.

If a security association is configured for the foreign agent, the foreign-home authentication extension is verified; otherwise, authentication success is based only on the mobile-home authenticator.

The home agent checks the identification (ID) field to verify that a registration message has been freshly generated by the mobile node, and is not simply being replayed by an attacker from some previous registration. The ID field represents a 64-bit Network Time Protocol (NTP)-formatted time value. The configured replay timestamp defines the tolerance time window in seconds by which a registration request timestamp and the local time of the HA can differ. By default, the timestamp must be within 7 seconds of the replay tolerance configured for the mobile node or, if that is configured, the timestamp tolerance of the home agent itself.

Reauthentication

Reauthentication is not currently supported by the authentication process. Mobile IP caches a security association for each mobile node helps overcome this limitation. When a mobile node requests re-registration or de-registration, Mobile IP refers to the cached security association for that mobile node and performs MD5 message authentication.

When the security association for the mobile node changes after the node is authenticated, the cache entry is not invalidated. Consequently, the mobile node's RRQ is rejected. In this case you must clear the binding with the mobile node so that it can de-register and then log in.

RADIUS server configuration changes relating to the subscriber do not propagate to the cache. In this case you must clear the binding with the mobile node so that it can de-register and then log in.

AAA Authentication

You can store the security associations and configuration information remotely on a RADIUS server. The home agent applies the authentication algorithm and security key to the mobile node's message. The AAA server uses Juniper Networks vendor-specific attributes (VSAs) listed in Table 40 on page 307. These VSAs are mandatory in the reply to provide the appropriate authentication algorithm and the secure key for the authentication request. If the security parameters are not retrieved, then the request for mobility service is rejected, a security violation error is logged, and no registration reply is generated.

Table 40: Juniper VSAs Used by Mobile IP

Attribute Number	Attribute Name	Description	Value
26–84	Mobile-IP-Algorithm	Authentication algorithm used for Mobile-IP registration	integer: 4-octet
26–85	Mobile-IP-SPI	Security parameter index for Mobile IP registration	integer: 4-octet

Table 40: Juniper VSAs Used by Mobile IP *(continued)*

Attribute Number	Attribute Name	Description	Value
26–86	Mobile-IP-Key	Security association MD5 key for Mobile IP registration	string: key
26–87	Mobile-IP-Replay	Replay timestamp for Mobile IP registration	integer: 4-octet
26–89	Mobile-IP-Lifetime	Registration lifetime for Mobile IP registration	integer: 4-octet

AAA authentication is accomplished by generating a AAA access-request to a AAA server. This is the default authentication mode, but you can include the **authenticate order aaa** statement at the **[edit services mobile-ip]** hierarchy level to explicitly configure AAA authentication. You cannot configure a fallback mechanism for AAA authentication. If the AAA request times out, the home agent does not fall back on the local router to determine the authentication parameters. The registration request is rejected. When the message is authenticated, the AAA server always returns either the Framed-IP-Address or Framed-Pool attribute for the user.

The presence of the mobile node's NAI and home IP address in the authentication request that the home agent sends to the AAA server is determined by their presence in the mobile node RRQ received by the home agent:

- When both the NAI and home IP address of the mobile node are present in the registration request, then the authentication request from Mobile IP to AAA has the NAI as the user name.
- When only the NAI is present in the registration request, then the NAI is used as the user name.
- When only the IP address (home address) is present in the registration request, then the IP address is used as the user name.
- When both the NAI address and the IP address are missing from the registration request, then the registration request is rejected.

Local Authentication

As an alternative to the default authentication by AAA server, you can store the security associations and configuration information locally on the router hosting the home agent. Local authentication is accomplished by querying the locally configured security parameters for the mobile node. The home agent applies the authentication algorithm and security key to the mobile node's message. If the security parameters are not available or do not match the RRQ, then the request for mobility service is rejected, a security violation error is logged, and no registration reply is generated.

For local authentication, include the **authenticate order local** statement at the **[edit services mobile-ip]** hierarchy level. You cannot configure a fallback mechanism for local

authentication. If the local authentication fails, the home agent does not fall back on the AAA server to determine the authentication parameters. The registration request is rejected. Include the **peer** statement at the **[edit services mobile-ip]** hierarchy level to configure the authentication attributes on the home agent for a user identified by IP address or network address identifier (NAI). This user can be a mobile node or a foreign agent.

The authentication attributes include a security parameter index (SPI) to identify a particular security context between the home agent and the mobile node or foreign agent among the contexts available in the mobility security association. Associated with each SPI is the MD5 algorithm and key used to authenticate messages from the mobile node or foreign agent. You can also configure the replay timestamp tolerance for the mobile node or foreign agent.

When local authentication is configured, you can configure Mobile IP independently in any named routing instance in any configured logical router. All Mobile IP statements are available in those contexts, except for the **order aaa** statement at the **[edit services mobile-ip authenticate]** hierarchy level.

Accounting

The Junos Mobile IP home agent application supports time-based accounting for Mobile IP subscribers. Include the **statistics time** statement in the subscriber access profile at the **[edit access profile profile-name accounting]** hierarchy level. Time-based accounting for Mobile IP subscribers also requires that you include the **authenticate order aaa** statement at the **[edit services mobile-ip]** hierarchy level. Accounting begins when the Mobile IP home agent registers the mobile node and creates a binding with the mobile node.

Accounting stops when the binding is deleted. Any of the following actions can cause the binding to be deleted:

- The mobile user logs off.
- The binding lifetime expires.
- The mobile node is deregistered for any reason.
- The foreign agent sends a revocation message.

The Acct-Start message the home agent sends to the AAA server includes the network address identifier (NAI) in the User-Name attribute and the home address of the mobile IP node in the Framed-IP-Address attribute. The Acct-Stop message additionally includes the Acct-Session-Id and Acct-Session-Time attributes.

You cannot currently configure time-based accounting for only the Mobile IP service in a given logical router or routing instance. Enabling time-based accounting for Mobile IP also enables time-based accounting for all other services that are configured in that logical router or routing instance. If you do not want time-based accounting to apply to other services, then you must configure those services in a different logical router or routing instance.

Related Documentation

- For information about the specific Juniper Networks VSAs used for Mobile IP RADIUS-based authentication, see Juniper Networks VSAs Supported by the AAA Service Framework on page 45
- Mobile IP Home Agent Elements and Behavior on page 303
- Mobile IP Routing and Forwarding on page 310
- Mobile IP in the WiMAX Environment on page 311
- Configuring Mobile IP on page 315

Mobile IP Routing and Forwarding

Mobile IP employs a care-of address to process traffic for the mobile node.

The mobile node acquires the a care-of address from the foreign agent. The care-of address is reachable from the mobile node, and routable from the home agent. The mobile node includes the care-of address in its registration request to the home agent. After AAA or local authentication successfully processes and authenticates the RRQ and provides both the authorization parameters for the mobile node and an IP address, the home agent then sets up the data path for the mobile node and sends back a registration reply (RRP) confirming successful registration of the mobile node.

When the foreign agent receives the successful RRP from the home agent, the foreign agent sets up the data path for the mobile node. Then it sends the RRP to the mobile node to acknowledge that the mobile node is now successfully registered and the data path between the home agent and the mobile node is in place.

The home agent supports generic routing encapsulation (GRE) and IP-in-IP tunnel encapsulation for forward and reverse tunneling. The tunnels must be statically configured. When packets destined for the mobile node reach a home agent, the home agent encapsulates the packets and tunnels them to the care-of address. Packets that exceed the maximum transmission unit (MTU) value of the tunnel are dropped and an ICMP error message is sent to the source IP address. Packets without an access route are returned to the source with an ICMP destination unreachable error message. For reverse tunnels, packets are de-tunneled and forwarded towards the next hop to the destination address.

Mobile IP does not support Graceful Routing Engine Switchover (GRES). It handles the rebooting of processes in the following ways:

- Mobile IP process—After Mobile IP completes a restart, it removes the Mobile IP subscriber entries from AAA and the session database. When that is complete, Mobile IP can process new mobile node registration requests.
- AAA process—After AAA completes a restart, Mobile IP removes all subscriber data held internally by AAA and all corresponding session database entries.
- Routing protocol process—When the connection between the routing protocol process and Mobile IP is lost, Mobile IP responds by clearing the mobile node bindings that are associated with the logical system in which the routing protocol process restarted. The

routing protocol process maintains routes to mobile nodes during the restart. The routing protocol process flushes these routes if they are not reinstalled after the restart completes and before the stale route timer expires.

Related Documentation

- Mobile IP Home Agent Elements and Behavior on page 303
- Mobile IP Registration on page 306
- Mobile IP in the WiMAX Environment on page 311
- Configuring Mobile IP on page 315

Mobile IP in the WiMAX Environment

Worldwide Interoperability for Microwave Access (WiMAX) is the international standard for wide area radio access networks. It provides a framework for networks that are implemented in different ways to successfully interoperate with mobile subscribers that roam among the networks. This interoperability enables the subscribers to be authenticated by their home network wherever they roam, and to receive the services for which they are authorized.

The Mobile IP home agent can operate in either of two access modes, generic and WiMAX. The generic access type is appropriate when the home agent is deployed in a generic Mobile IP home network. When deployed as a home agent in a WiMAX home connectivity services network (H-CSN), you must configure the WiMAX access type. The WiMAX access type enables the Mobile IP home agent to receive, process, and send WiMAX vendor-specific attributes (VSAs) that are used by AAA and the RADIUS server to authenticate the mobile subscriber. When the access type is generic, the Mobile IP home agent cannot handle these VSAs.

NOTE: The Mobile IP configuration for WiMAX requires that AAA be used for the authentication method. For that reason, WiMAX is available only in the default router context.

A WiMAX H-CSN is analogous to the Mobile IP home network for non-WiMAX implementations. When WiMAX is enabled for the Mobile IP home agent in an H-CSN, the Mobile IP home agent triggers subscriber authentication when the agent receives the registration request. The home agent stores WiMAX Forum (vendor ID 24757) vendor-specific attributes (VSAs) listed in Table 41 on page 312 in the session database based on the registration request.

Table 41: WiMAX Forum VSAs used by Mobile IP

Attribute Number	Attribute Name	Description	Value
26–1	WiMAX-Capability	Identifies the WiMAX capabilities supported by the home agent (sent in the Access-Request message). In an Access-Accept message, Identifies the capabilities selected by the RADIUS server (returned in the Access-Accept message).	string or integer
26–6	hHA-IP-MIP4	IP address of the home home agent (hHA) making the request	octet string: IP address
26–10	MN-HA-MIP4-KEY	MN-hHA key sent by the RADIUS server for validation by the home agent	integer: 2-octet salt followed by 16-octet encrypted MN-hHA hash key
26–11	MN-HA-MIP4-SPI	Security parameter index (SPI) associated with the MN-HA-MIP4 key	integer: 4-octet
26–15	hHA-RK-KEY	Key used by the NAS to generate FA-HA keys	integer: 2-octet salt followed by 16-octet encrypted MN-hHA hash key
26–16	hHA-RK-SPI	SPI associated with the hHA-RK key	integer: 4-octet
26–17	HA-RK-Lifetime	Lifetime of the hHA-RK key and derived keys	integer: 4-octet
26–18	RRQ-HA-IP	IP address of the home agent contained in the Mobile IP registration request or the binding update	octet string: IP address

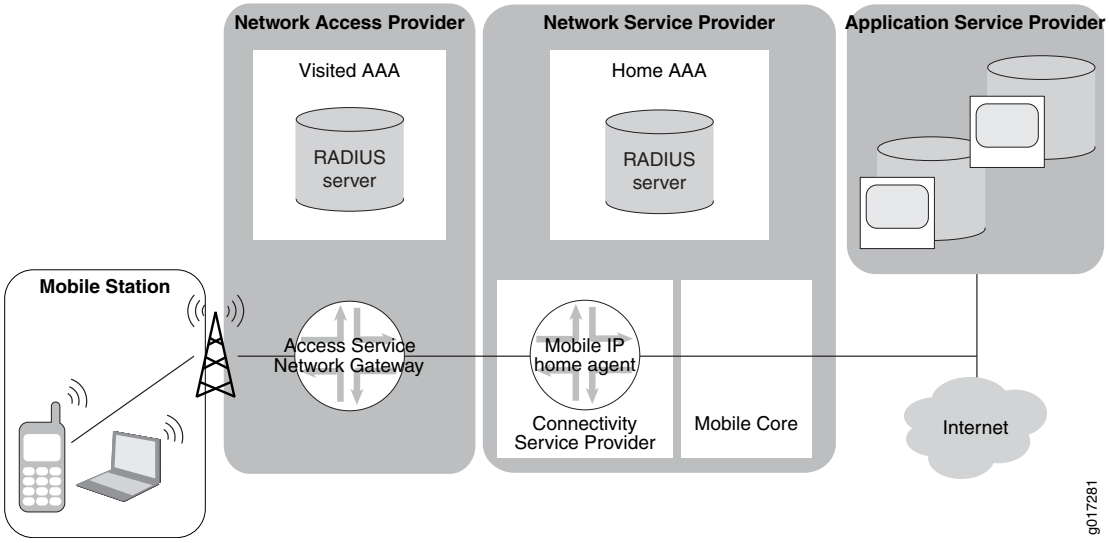
Table 41: WiMAX Forum VSAs used by Mobile IP *(continued)*

Attribute Number	Attribute Name	Description	Value
26–19	RRQ-MN-HA-KEY	The MN-HA key bound to the home agent IP address as reported by the RRQ-HA-IP attribute. Used to validate the MN-HA-AE of the Mobile IP registration request.	integer: 2-octet salt followed by 16-octet encrypted MN-hHA hash key

The home agent requests AAA to fetch the corresponding WiMAX-related information from the RADIUS server. The AAA client sends an Access-Request message to the server. The RADIUS server responds with the necessary WiMAX information, such as the MN-HA key and the HA-RK key, and then the AAA client passes the response to the home agent. The Mobile IP home agent verifies the response received from AAA, processes the registration request, and then grants, extends, or denies subscriber registration.

Figure 8 on page 313 shows the elements of a sample WiMAX topology.

Figure 8: Sample Mobile IP WiMAX Topology



The Mobile IP subscriber registration flow is a four-step process.

1. The access service network gateway (ASN-GW) sends the subscriber registration request from the mobile node to the Mobile IP home agent. The registration request is protected by the MN-HA authentication extension and the FA-HA authentication extension.
2. The home agent requests that the RADIUS server send the cryptographic keys for the Mobile IP session identified by user@realm. The home agent announces to the RADIUS server that it would like to source IP session-based accounting messages.

3. The RADIUS server agrees to use IP session-based accounting, provides the requested cryptographic keys, and sends the AAA-Session-ID for this session.
4. The home agent replies to the Mobile IP registration request.

Reauthentication of WiMAX subscribers is not currently supported.

You can configure the Mobile IP home agent for WiMAX access by including the **wimax** statement at the **[edit services mobile-ip access-type**] hierarchy level. You can prevent the Mobile IP home agent from being able to process WiMAX VSAs by either removing the **wimax** statement at the **[edit services mobile-ip access-type**] hierarchy level or by including the **generic** statement at the **[edit services mobile-ip access-type**] hierarchy level. The default access type for Mobile IP home agent is generic.

Related Documentation

- For information about the specific Juniper Networks VSAs used for Mobile IP RADIUS-based authentication, see Juniper Networks VSAs Supported by the AAA Service Framework on page 45
- Mobile IP Home Agent Elements and Behavior on page 303
- Mobile IP Registration on page 306
- Mobile IP Routing and Forwarding on page 310
- Configuring Mobile IP on page 315

CHAPTER 29

Configuring Mobile IP

Configuring Mobile IP

You can configure Mobile IP to provide mobility for subscribers in IP networks. The Mobile IP home agent authenticates registration requests from mobile users and forward traffic to them at their care-of address without having to advertise that address to the wider network.

To configure Mobile IP for mobile subscriber access:

1. Configure the authentication method for registration requests, local or AAA.

   See “Configuring the Mobile IP Authentication Method” on page 319.

2. Configure the Mobile IP home agent.

   See “Configuring the Mobile IP Home Agent” on page 319.

3. Configure the authentication attributes for the mobile node.

   See “Configuring the Local Authentication Attributes for the Mobile Node” on page 320.

4. Configure accounting for Mobile IP subscribers.

   See “Configuring Accounting for Mobile IP Subscribers” on page 321

5. Configure the dynamic reassignment of the mobile node to another home agent.

   See “Configuring Dynamic Home Assignment for the Mobile Node” on page 321.

6. Configure the access type for Mobile IP.

See “Configuring the Access Type for Mobile IP” on page 322.

7. Configure trace options for troubleshooting the configuration.

   See “Tracing Mobile IP Operations” on page 316.

Tracing Mobile IP Operations

The Junos OS trace feature tracks Mobile IP operations and records events in a log file. The error descriptions captured in the log file provide detailed information to help you solve problems.

Trace-related configurations are independent for each logical system and routing instance in which Mobile IP is configured. Mobile IP can generate two types of log messages:

- Trace messages common to all logical systems and routing instances in which Mobile IP is configured. Examples of this global message type are the messages generated by Mobile IP during initialization after it starts up. These trace messages are stored in the default trace file, **/var/log/mipd**. You cannot configure Mobile IP to save global messages in a different file. Mobile IP traces global messages by default.
- Trace messages specific to a logical system or routing instance in which Mobile IP is configured. An example of this message type is the message generated by Mobile IP when it receives a registration request. These trace messages are stored in the trace file configured for that logical system or routing instance. These messages cannot be saved in **/var/log/mipd**.

Tracing operations take place as follows:

1. Global messages are logged in the **/var/log/mipd** file. Logical system or routing instance messages are logged in a file that you must configure, also located in the **/var/log** directory. You cannot change the directory (**/var/log**) in which trace files are located.
2. When the file reaches 128 kilobytes (KB), it is renamed until there are three trace files. For example, **mipd** becomes **mipd.0**, then **mipd.1**, and then **mipd.2**). Then the oldest trace file (**mipd.2**) is overwritten.

   You can optionally configure the maximum file size to be from 10 KB through 1 gigabyte (GB). You can also specify the number of trace files to be from 2 through 1000. (For more information about how log files are created, see the *Junos OS System Log Messages Reference*.)

By default, only the user who configures the tracing operation can access log files. You can optionally configure read-only access for other users.

The Mobile IP tracing options are described in the following sections:

- Configuring the Mobile IP Trace Log Filename on page 317
- Configuring the Number and Size of Mobile IP Log Files on page 317
- Configuring Access to the Mobile IP Log File on page 317

- Configuring a Regular Expression for Mobile IP Lines to Be Logged on page 318
- Configuring the Mobile IP Tracing Flags on page 318

Configuring the Mobile IP Trace Log Filename

Global messages common to all Mobile IP logical systems and routing instances are recorded only in **/var/log/mipd**. Mobile IP automatically creates this file if it is not present when Mobile IP starts. You cannot configure global messages to be recorded in any other file.

You must specify a different name with the **file** option for messages that are specific to a logical system or routing instance in which Mobile IP is configured. Ensure that filenames are unique for each logical system or routing instance in which Mobile IP is configured. If you do not configure a trace filename for a logical system or routing instance, then nothing is traced for that entity.

To configure the filename for Mobile IP tracing operations for a logical system or routing instance:

- Specify the name of the file used for the trace output.

```
[edit logical-systems lr1 services mobile-ip traceoptions]
user@host# set file mip-lr1_1
```

Configuring the Number and Size of Mobile IP Log Files

By default, when the trace file reaches 128 kilobytes (KB) in size, it is renamed ***filename*.0**, then ***filename*.1**, and so on, until there are three trace files. Then the oldest trace file (***filename*.2**) is overwritten.

You can optionally configure the maximum file size to be from 10 KB through 1 gigabyte (GB). You can also specify the number of trace files to be from 2 through 1000.

For example, you can set the maximum file size to 2 MB, and the maximum number of files to 20. When the file that receives the output of the tracing operation (***filename***) reaches 2 MB, ***filename*** is renamed ***filename*.0**, and a new file called ***filename*** is created. When the new ***filename*** reaches 2 MB, ***filename*.0** is renamed ***filename*.1** and ***filename*** is renamed ***filename*.0**. This process repeats until there are 20 trace files. Then the oldest file (***filename*.19**) is overwritten by the newest file (***filename*.0**).

To configure the number and size of trace files:

- Specify the name, number, and size of the file used for the trace output. (Mobile IP supports the **files** and **size** options for the **traceoptions** statement.)

```
[edit services mobile-ip traceoptions]
user@host# set file mip_1 _logfile_1 files 20 size 2097152
```

Configuring Access to the Mobile IP Log File

By default, only the user who configures the tracing operation can access the log files. You can enable all users to read the log file and you can explicitly set the default behavior of the log file.

To specify that all users can read the log file:

- Configure the log file to be world-readable.

  ```
  [edit services mobile-ip traceoptions]
  user@host# set file mip_1 _logfile_1 world-readable
  ```

To explicitly set the default behavior, only the user who configured tracing can read the log file:

- Configure the log file to be no-world-readable.

  ```
  [edit services mobile-ip traceoptions]
  user@host# set file mip_1 _logfile_1 no-world-readable
  ```

Configuring a Regular Expression for Mobile IP Lines to Be Logged

By default, the trace operation output includes all lines relevant to the logged events.

You can refine the output by including regular expressions that will be matched.

To configure regular expressions to be matched:

- Configure the regular expression.

  ```
  [edit services mobile-ip traceoptions]
  user@host# set file mip_1 _logfile_1 match regex
  ```

Configuring the Mobile IP Tracing Flags

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
authentication	Trace authentication operations
binding	Trace bindings
event	Trace events
home-agent	Trace home agent operations
interface-database	Trace interface database operations
packet	Trace packet decoding operations
protocol	Trace protocol operations
rtsock	Trace routing socket operations

Flag	Description
session-db	Trace session database events
signal	Trace signal operations
subscriber	Trace subscriber events
trace	Trace changes in tracing
tunnel	Trace tunneling operations
user-interface	Trace user interface operations

To configure the flags for the events to be logged:

- Configure the flags.

  ```
  [edit services mobile-ip traceoptions]
  user@host# set flag home-agent
  ```

Configuring the Mobile IP Authentication Method

You can configure Mobile IP to authenticate registration requests from mobile nodes by either the locally configured attributes or a AAA server. AAA server authentication is the default method.

NOTE: AAA server authentication is available only in the default router context. Local authentication is available in both default and nondefault router contexts.

To configure the Mobile IP authentication method:

- Specify either local or AAA authentication.

  ```
  [edit services mobile-ip]
  user@host# set authenticate order local
  ```

Related Documentation

- Configuring Mobile IP on page 315

Configuring the Mobile IP Home Agent

To configure the home agent for a Mobile IP virtual network:

1. Configure the loopback IP address that is used as the home agent IP address.

   ```
   [edit services mobile-ip home-agent virtual-network]
   user@host# set home-agent-address 10.5.5.0
   ```

2. (Optional) Configure the maximum lifetime that the home agent accepts in any registration request from a mobile node.

   ```
   [edit services mobile-ip home-agent virtual-network]
   user@host# set home-agent-address 10.5.5.0 registration-lifetime 100
   ```

3. (Optional) Configure a timestamp tolerance for registration replay protection.

   ```
   [edit services mobile-ip home-agent virtual-network]
   user@host# set home-agent-address 10.5.5.0 timestamp-tolerance 200
   ```

4. Configure whether the home agent can revoke a mobile node's registration to deactivate the node.

   ```
   [edit services mobile-ip home-agent virtual-network]
   user@host# set home-agent-address 10.5.5.0 revocation-required
   ```

5. Specify the interfaces on which the home agent accepts registration requests.

   ```
   [edit services mobile-ip home-agent]
   user@host# set enable-service ge-0/0/1.0
   user@host# set enable-service ge-0/0/2.0
   user@host# set enable-service ge-0/0/3.0
   user@host# set enable-service ge-0/0/4.0
   ```

Related Documentation

- Configuring Mobile IP on page 315

Configuring the Local Authentication Attributes for the Mobile Node

You specify for each mobile node several attributes that enable authentication of registration requests from the node. These attributes include security association context for the peering relationship, the entity type of the node, the encryption algorithm and key used to authenticate the request, and replay protection.

To configure authentication attributes for the mobile node:

1. Configure the peer entity for the security parameter.

   ```
   [edit services mobile-ip]
   user@host# set peer ip-address 10.4.2.20 spi 500 entity-type mobility-agent
   ```

2. Configure the algorithm used for authenticating Mobile IP messages. By default, the hmac-md5 algorithm is used.

   ```
   [edit services mobile-ip]
   user@host# set peer ip-address 10.4.2.20 spi 500 algorithm md5
   ```

3. Configure the authentication key for the security association, in either HEX or ASCII format.

   ```
   [edit services mobile-ip]
   user@host# set peer ip-address 10.4.2.20 spi 500 key ascii xf125j9m
   ```

4. Configure a timestamp tolerance for registration replay protection or specify that the timestamp tolerance be taken from the value configured on the home agent.

   ```
   [edit services mobile-ip]
   ```

```
user@host# set peer ip-address 10.4.2.20 spi 500 replay-method timestamp tolerance
  250
```

Related Documentation

- Configuring Mobile IP on page 315

Configuring Accounting for Mobile IP Subscribers

You can configure time-based accounting to track the subscriber sessions of Mobile IP subscribers.

To configure Mobile IP accounting:

1. Configure the IP address for the RADIUS accounting server.

   ```
   [edit access profile mip-win4]
   user@host# set radius accounting-server 192.168.20.5
   ```

2. Specify RADIUS as the accounting method for Mobile IP subscribers.

   ```
   [edit access profile mip-win4 accounting]
   user@host# set order radius
   ```

3. Specify time-based accounting for the access profile used for the subscriber.

   ```
   [edit access profile mip-win4 accounting]
   user@host# set statistics time
   ```

Related Documentation

- Configuring Mobile IP on page 315
- Specifying the Authentication and Accounting Methods for Subscriber Access on page 20
- Configuring Per-Subscriber Session Accounting on page 24
- Configuring RADIUS Server Parameters for Subscriber Access on page 26

Configuring Dynamic Home Assignment for the Mobile Node

The mobile node can request that the home agent dynamically assign an IP address for the home agent. The mobile node uses this address for the home agent in all subsequent registration requests until the registration expires or the mobile node is rebooted.

To configure the IP address to be used by the mobile node for the home agent:

- Configure the IP address for the specified mobile node.

  ```
  [edit services mobile–ip]
  user@host# set dynamic-home-assignment home-agent nai bws@example.com
    home-agent 192.168.4.5
  ```

Related Documentation

- Configuring Mobile IP on page 315

Configuring the Access Type for Mobile IP

You can configure the Mobile IP home agent to operate in a Worldwide Interoperability for Microwave Access (WiMAX) home connectivity services network (H-CSN). This configuration enables the home agent to receive, process, and send WiMAX VSAs for subscriber authentication and registration. By default, Mobile IP cannot process the WiMAX VSAs. For operation in non-WiMAX environments, you can return it to this mode by configuring the **generic** access type.

NOTE: The Mobile IP configuration for WiMAX requires that AAA be used for the authentication method. For that reason, WiMAX is available only in the default router context.

To configure the access type, do one of the following:

- Configure generic operation.

  ```
  [edit services mobile-ip]
  user@host# set access-type generic
  ```

- Configure WiMAX operation.

  ```
  [edit services mobile-ip]
  user@host# set access-type wimax
  ```

Related Documentation

- Configuring Mobile IP on page 315

PART 9

Dynamic Profiles for Access and Services

CHAPTER 30

Dynamic Profiles Overview

Dynamic Profiles Overview

A dynamic profile is a set of characteristics, defined in a type of template, that you can use to provide dynamic subscriber access and services for broadband applications. These services are assigned dynamically to interfaces. The **dynamic-profiles** hierarchy appears at the top level of the CLI hierarchy and contains many Juniper Networks configuration statements that you normally define statically.

Dynamic profile statements appear in the following subhierarchies within the **[edit dynamic-profiles]** hierarchy:

- **class-of-service**
- **firewall**
- **interfaces**
- **predefined-variable-defaults**
- **protocols**
- **routing-instances**
- **routing-options**
- **variables**

This topic covers:

Dynamic Profile Interface Support

You can identify subscribers statically or dynamically. To identify subscribers statically, you can reference a static VLAN interface in a dynamic profile. To identify subscribers dynamically, you create variables for demux interfaces that are dynamically created when subscribers log in.

What Dynamic Profiles Do

A dynamic profile acts as a kind of template that enables you to create, update, or remove a configuration that includes client access (for example, interface or protocol) or service (for example, CoS) attributes. Using these profiles enables you to consolidate all of the common attributes of a client (and eventually a group of clients) and apply the attributes simultaneously.

How Dynamic Profiles Work

After they are created, profiles reside on the router in a profile library. These profiles can contain various configurations. For example, you can create a client network access configuration, a services activation configuration, or both. When a router interface receives a join message from a DHCP client, the router applies the values configured in the specified dynamic profile to that router interface. In this release, the profile can contain interface, class of service (CoS), and protocol (IGMP) values that are applied directly to the interface. In addition, the dynamic profile can call input or output firewall filters that reside outside of the dynamic profiles hierarchy.

Dynamic Profile Semantic Checking

Variables are applied to dynamic profiles dynamically and cannot be checked with existing CLI checks. Semantic checking validates some variables in dynamic profiles to help identify potential configuration errors.

Semantic checks are performed during commit and during profile instantiation. Commit time checks ensure that variables appear in the correct location within the dynamic profile. Checks performed before profile instantiation ensure that the values that replace the variables are correct. The checks performed on the values include the following:

- Range validation
- Variable type validation
- Existence of variables where they are mandatory
- Variable matching to regular expressions

A commit time check failure results in an error message being displayed and logged into **/var/log/messages** and the commit not taking place. An instantiation failure results in an error being logged in **/var/log/messages** and the profile instantiation failing.

Related Documentation

- Configuring a Basic Dynamic Profile on page 349
- Configuring a Dynamic Profile for Client Access on page 353
- Configuring a Dynamic Profile for Various Levels of Services on page 355

Dynamic Variables Overview

Variables constitute the dynamic component of a dynamic profile. You use variables in dynamic profiles as placeholders for dynamically obtained or dynamically generated information that the dynamic profiles use to configure subscriber interfaces.

How Dynamic Variables Work

Dynamic variables are data placeholders that you define and place in dynamic profiles. When a particular event occurs on an interface (for example, a DHCP client accesses the interface), the dynamic profiles obtain data to fill these placeholders from one of three possible sources—the interface receiving an incoming client data packet, an externally configured server (for example, RADIUS), or a value associated with each user-configurable variable.

For your convenience, Junos OS provides several predefined variables that you can use within a dynamic profile. Most of these variables relate to interface-specific data obtained directly from the interface that receives an incoming client data packets (for example, interface name, interface unit value, and so on). When a client accesses the interface, the router software extracts the necessary interface data, propagates this data to the dynamic profile, and then uses the dynamic profile to configure the interface for the accessing client.

You define user-defined variables for individual dynamic profiles at the **[dynamic-profiles *profile-name* variables]** hierarchy level. At this hierarchy level, you create an association between a variable value (for example, **$junos-igmp-version**) that appears in the body of the dynamic profile and data associated with that call value that is managed in an externally configured server (for example, a RADIUS VSA managed on a RADIUS server) or defined as a value in the **variables** stanza. When an event occurs on an interface to trigger the instantiation of a dynamic profile for the interface, the Junos OS obtains values for each variable from an external server (for example, from RADIUS authentication and authorization VSAs) during the subscriber authentication process. At run time, the variables are replaced by these actual values and are used to configure the subscriber interface.

Default Values for Predefined Variables

You can optionally configure default values for many of the predefined variables. If the external RADIUS server is not available or the VSA does not contain a value for the predefined variable, the Junos OS uses the default values.

When a default value is configured for a variable and RADIUS also returns a value, the system uses the value from RADIUS instead.

Related Documentation

- Configuring a Basic Dynamic Profile on page 349
- Configuring a Dynamic Profile for Client Access on page 353
- Configuring a Dynamic Profile for Various Levels of Services on page 355
- Junos Predefined Variables on page 328
- User-Defined Variables on page 348
- Junos Predefined Variables That Correspond to RADIUS Attributes and VSAs on page 341
- Configuring Predefined Dynamic Variables in Dynamic Profiles on page 350
- Configuring User-Defined Dynamic Variables in Dynamic Profiles on page 352
- Dynamic Profiles Overview on page 325
- Subscriber Interface Overview on page 391
- Example: Firewall Dynamic Profile on page 360
- Example: IGMP Dynamic Profile on page 359
- RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework on page 38

Junos Predefined Variables

Junos OS contains several predefined variables. The dynamic profile obtains and replaces data for these variables from an incoming client data packet and configuration (local and RADIUS). These variables are predefined—you use them in the body of a dynamic profile without first having to define the variables at the **[dynamic-profiles *profile-name* variables]** hierarchy level. Table 42 on page 328 provides a list of predefined variables, their descriptions, and where in the Junos hierarchy you can configure them.

Table 42: Junos Predefined Variables and Definitions

Variable	Definition
Access and Access-Internal Routes	
$junos-framed-route-cost	Cost metric of an access route. You specify this variable at the **[edit dynamic-profiles *profile-name* routing-options access route *address*]** hierarchy level for the **metric** statement.
$junos-framed-route-distance	Distance of an access route. You specify this variable at the **[edit dynamic-profiles *profile-name* routing-options access route *address*]** hierarchy level for the **preference** statement.
$junos-framed-route-ip-address-prefix	Route prefix of an access route. You specify this variable at the **[edit dynamic-profiles *profile-name* routing-options access]** hierarchy level for the **route** statement.

Table 42: Junos Predefined Variables and Definitions *(continued)*

Variable	Definition
$junos-framed-route-ipv6-address-prefix	IPv6 route prefix of an access route. You specify this variable at the **[edit dynamic-profiles *profile-name* routing-options access]** hierarchy level for the **route** statement.
$junos-framed-route-ipv6-nexthop	IPv6 next-hop address of an access route. You specify this variable at the **[edit dynamic-profiles *profile-name* routing-options access route *address*]** hierarchy level for the **next-hop** statement.
$junos-framed-route-nexthop	Next-hop address of an access route. You specify this variable at the **[edit dynamic-profiles *profile-name* routing-options access route *address*]** hierarchy level for the **next-hop** statement.
$junos-framed-route-tag	Tag value of an access route. You specify this variable at the **[edit dynamic-profiles *profile-name* routing-options access route *address*]** hierarchy level for the **tag** statement.
$junos-interface-name	Logical interface of an access-internal route. DHCP or PPP supplies this information when the subscriber logs in. You specify this variable at the **[edit dynamic-profiles *profile-name* routing-options access-internal route *address*]** hierarchy level for the **qualified-next-hop** statement. This variable is also used for creating dynamic IP demux interfaces.
$junos-subscriber-ip-address	IP address of a subscriber identified in an access-internal route. You specify this variable at the **[edit dynamic-profiles *profile-name* routing-options access-internal]** hierarchy level for the **route** statement. This variable is also used for creating dynamic IP demux interfaces.
$junos-subscriber-mac-address	MAC address for a subscriber identified in an access-internal route. You specify this variable at the **[edit dynamic-profiles *profile-name* routing-options access-internal route *address* qualified-next hop *underlying-interface*]** hierarchy level for the **mac-address** statement.
Dynamic Protocols	
$junos-igmp-access-group-name	Specifies the access list to use for the source (S) filter.

Table 42: Junos Predefined Variables and Definitions *(continued)*

Variable	Definition
$junos-igmp-access-source-group-name	Specifies the access list to use for the source-group (S,G) filter.
$junos-igmp-enable	Ensures that IGMP is not disabled on the interface by an AAA-based authentication and management method (for example, RADIUS). You specify this variable at the **[dynamic-profiles *profile-name* protocols igmp]** hierarchy level for the interface statement.
$junos-igmp-immediate-leave	Enables IGMP immediate leave on the interface. You specify this variable at the **[dynamic-profiles *profile-name* protocols igmp]** hierarchy level for the interface statement.
$junos-igmp-version	IGMP version configured in a client access profile. The Junos OS obtains this information from the RADIUS server when a subscriber accesses the router. The version is applied to the accessing subscriber when the profile is instantiated. You specify this variable at the **[dynamic-profiles *profile-name* protocols igmp]** hierarchy level for the interface statement.
$junos-interface-name	Name of the dynamic interface to which the subscriber access client connects. Its use is in dynamically enabling IGMP on the subscriber interface. You specify this variable at the **[dynamic-profiles *profile-name* protocols igmp]** hierarchy level for the **interface** statement. The interface name is derived from concatenating the **$junos-interface-ifd-name** and the **$junos-underlying-interface-unit** variables obtained when a subscriber is created dynamically at the **[dynamic-profiles *profile-name* interfaces]** hierarchy level.
$junos-ipv6-ndra-prefix	Prefix value for the router advertisement interface. The Junos OS obtains this information from the RADIUS server when a subscriber accesses the router. The prefix value is applied to the accessing subscriber when the profile is instantiated. You specify this variable at the **[dynamic-profiles *profile-name* protocols router-advertisement interface *$junos-interface-name*]** hierarchy level.
$junos-mld-access-group-name	Specifies the access list to use for the group (G) filter.
$junos-mld-access-source-group-name	Specifies the access list to use for the source-group (S,G) filter.

Table 42: Junos Predefined Variables and Definitions *(continued)*

Variable	Definition
$junos-mld-enable	Ensures that MLD is not disabled on the interface by an AAA-based authentication and management method (for example, RADIUS). You specify this variable at the **[dynamic-profiles *profile-name* protocols mld]** hierarchy level for the interface statement.
$junos-mld-immediate-leave	Enables MLD immediate leave on the interface. You specify this variable at the **[dynamic-profiles *profile-name* protocols mld]** hierarchy level for the interface statement.
$junos-mld-version	MLD version configured in a client access profile. The Junos OS obtains this information from the RADIUS server when a subscriber accesses the router. The version is applied to the accessing subscriber when the profile is instantiated. You specify this variable at the **[dynamic-profiles *profile-name* protocols mld]** hierarchy level for the interface statement.
Dynamic CoS — Traffic-Shaping Parameters	
$junos-cos-byte-adjust	Byte adjustment value configured in a traffic-control profile in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **bytes** option with the **overhead-accounting** statement at the **[edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles *profile-name*]** hierarchy level.
$junos-cos-delay-buffer-rate	Delay-buffer rate configured in a traffic-control profile in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **delay-buffer-rate** statement at the **[edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles *profile-name*]** hierarchy level.

Table 42: Junos Predefined Variables and Definitions *(continued)*

Variable	Definition
$junos-cos-excess-rate	Excess rate configured in a traffic-control profile in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **excess-rate** statement at the **[edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles *profile-name*]** hierarchy level.
$junos-cos-guaranteed-rate	Guaranteed rate configured in a traffic-control profile in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **guaranteed-rate** statement at the **[edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles *profile-name*]** hierarchy level.
$junos-cos-scheduler-map	Scheduler-map name configured in a traffic-control profile in a dynamic profile for used for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **scheduler-map** statement at the **[edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles *profile-name*]** hierarchy level. **NOTE:** The scheduler map can be defined dynamically (at the **[edit dynamic-profiles *profile-name* class-of-service scheduler-maps]** hierarchy level) or statically (at the **[edit class-of-service scheduler-maps]** hierarchy level).

Table 42: Junos Predefined Variables and Definitions *(continued)*

Variable	Definition
$junos-cos-shaping-mode	Shaping mode configured in a traffic-control profile in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **overhead-accounting** statement at the **[edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles *profile-name*]** hierarchy level.
$junos-cos-shaping-rate	Shaping rate configured in a traffic-control profile in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **shaping-rate** statement at the **[edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles *profile-name*]** hierarchy level.
Dynamic CoS — Scheduler Parameters	
$junos-cos-scheduler	Name of a scheduler configured in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable at the **[edit dynamic-profiles *profile-name* class-of-service schedulers]** hierarchy level.
$junos-cos-scheduler-bs	Buffer size as a percentage of total buffer, specified for a scheduler configured in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **buffer-size** statement with the **percent** option at the **[edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]** hierarchy level.

Table 42: Junos Predefined Variables and Definitions *(continued)*

Variable	Definition
$junos-cos-scheduler-pri	Packet-scheduling priority value specified for a scheduler configured in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **priority** statement at the **[edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]** hierarchy level.
$junos-cos-scheduler-dropfile-any	Name of the drop profile for random early detection (RED) for loss-priority level **any** specified for a scheduler configured in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **drop-profile** statement at the **[edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name* drop-profile-map loss-priority any protocol any]** hierarchy level. **NOTE:** The drop profile must be configured statically (at the **[edit class-of-service drop-profiles]** hierarchy level).
$junos-cos-scheduler-dropfile-high	Name of the drop profile for random early detection (RED) for loss-priority level **high** specified for a scheduler configured in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **drop-profile** statement at the **[edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name* drop-profile-map loss-priority high protocol any]** hierarchy level. **NOTE:** The drop profile must be configured statically (at the **[edit class-of-service drop-profiles]** hierarchy level).

Table 42: Junos Predefined Variables and Definitions *(continued)*

Variable	Definition
$junos-cos-scheduler-dropfile-low	Name of the drop profile for random early detection (RED) for loss-priority level **low** specified for a scheduler configured in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **drop-profile** statement at the **[edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name* drop-profile-map loss-priority low protocol any]** hierarchy level. **NOTE:** The drop profile must be configured statically (at the **[edit class-of-service drop-profiles]** hierarchy level) for loss-priority **low**.
$junos-cos-scheduler-dropfile-medium-high	Name of the drop profile for random early detection (RED) for loss-priority level **medium-high** specified for a scheduler configured in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **drop-profile** statement at the **[edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name* drop-profile-map loss-priority medium-high protocol any]** hierarchy level. **NOTE:** The drop profile must be configured statically (at the **[edit class-of-service drop-profiles]** hierarchy level).

Table 42: Junos Predefined Variables and Definitions *(continued)*

Variable	Definition
$junos-cos-scheduler-dropfile-medium-low	Name of the drop profile for random early detection (RED) for loss-priority level **medium-low** specified for a scheduler configured in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **drop-profile** statement at the **[edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name* drop-profile-map loss-priority medium-low protocol any]** hierarchy level. **NOTE:** The drop profile must be configured statically (at the **[edit class-of-service drop-profiles]** hierarchy level).
$junos-cos-scheduler-excess-priority	Priority value of the excess rate specified for a scheduler configured in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **excess-priority** statement at the **[edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*** hierarchy level.
$junos-cos-scheduler-excess-rate	Value of the excess rate specified for a scheduler configured in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **excess-rate** statement at the **[edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*** hierarchy level.

Table 42: Junos Predefined Variables and Definitions *(continued)*

Variable	Definition
$junos-cos-scheduler-shaping-rate	Value of the shaping rate specified for a scheduler configured in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **shaping-rate** statement at the **[edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*** hierarchy level.
$junos-cos-scheduler-tx	Transmit rate specified for a scheduler configured in a dynamic profile for subscriber access. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the dynamic profile is attached. You reference this variable in the **transmit-rate** statement at the **[edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]** hierarchy level.
Filters — RADIUS-obtained Policies	
$junos-input-filter	Attaches a filter based on RADIUS VSA 26-10 (Ingress-Policy-Name) or RADIUS attribute 11 (Filter-ID) to the interface.
$junos-input-ipv6-filter	Attaches a filter based on RADIUS VSA 26-106 (IPv6-Ingress-Policy-Name) to the interface.
$junos-output-filter	Attaches a filter based on RADIUS VSA 26-11 (Egress-Policy-Name) to the interface.
$junos-output-ipv6-filter	Attaches a filter based on RADIUS VSA 26-107 (IPv6-Egress-Policy-Name) to the interface.
Subscriber Interfaces — Dynamic Demux Interfaces	

Table 42: Junos Predefined Variables and Definitions *(continued)*

Variable	Definition
$junos-interface-ifd-name	Name of the device to which the subscriber access client connects. All interfaces are created on this device. Its primary use is in creating single or multiple subscribers on a statically created interface. You specify this variable at the **[dynamic-profiles *profile-name* interfaces]** hierarchy level. When creating a logical underlying interface for a dynamic VLAN demux interface, you must also specify this variable at the **[dynamic-profiles *profile-name* interfaces *demux0* unit *$junos-interface-unit* demux-options underlying-interface]** hierarchy level.
$junos-interface-unit	Creates a unit number assigned to the logical interface. The router supplies this information when the subscriber accesses the network. You specify this variable at the **[dynamic-profiles *profile-name* interfaces *interface-name*]** hierarchy level for the **unit** statement.
$junos-ipv6-address	Selects the IPv6 address of the interface the subscriber uses. You specify this variable at the **[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family*]**, **[edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family *family*]**, **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family*]**, and **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*]** hierarchy level for the **address** statement.
$junos-loopback-interface	Selects the loopback interface the subscriber uses. You specify this variable at the **[dynamic profiles *profile-name* interfaces demux0 unit "$junos-interface-unit" family inet]** hierarchy level for the **unnumbered-address** statement.
$junos-preferred-source-address	Selects the preferred source address associated with the loopback address used for the subscriber. You specify this variable at the **[dynamic profiles *profile-name* interfaces demux0 unit "$junos-interface-unit" family inet unnumbered-address "$junos-loopback-interface"]** hierarchy level for the **preferred-source-address** statement.

Table 42: Junos Predefined Variables and Definitions *(continued)*

Variable	Definition
$junos-subscriber-ip-address	IP address of the subscriber. You specify this variable at the **[dynamic-profiles *profile-name* interfaces *demux0* unit family *inet* demux-source]** hierarchy level. This variable is also used for creating access-internal routes.
$junos-underlying-interface	Creates a logical underlying interface for a dynamic IP demux interface. The client logs in on this interface. You specify this variable at the **[dynamic profiles *profile-name* interfaces demux0 unit "$junos-interface-unit" demux-options]** hierarchy level for the **underlying-interface** statement. When configured, the underlying interface is used to determine the **$junos-underlying-interface**, **$junos-underlying-interface-unit**, and **$junos-ifd-name** variables. For example, if the receiving logical interface is ge-0/0/0.1, the **$junos-underlying-interface** variable is set to ge-0/0/0 and the **$junos-underlying-interface-unit** variable is set to 1. This variable is also used for creating access-internal routes.
Subscriber Interfaces — Static VLAN Interfaces	
$junos-interface-ifd-name	Name of the device to which the subscriber access client connects. All interfaces are created on this device. Its primary use is in creating single or multiple subscribers on a statically created interface. You specify this variable at the **[dynamic-profiles *profile-name* interfaces]** hierarchy level.
$junos-underlying-interface-unit	Obtains the unit number for the underlying interface. It specifies the use of the underlying interface for the subscriber. You specify this variable at the **[dynamic-profiles *profile-name* interfaces *$junos-interface-ifd-name*]** hierarchy for the **unit** statement.

Table 42: Junos Predefined Variables and Definitions *(continued)*

Variable	Definition
Subscriber Interfaces — Dynamic PPPoE Interfaces	
$junos-interface-unit	Specifies the logical unit number when the router dynamically creates a PPPoE logical interface. The **$junos-interface-unit** predefined variable is dynamically replaced with the unit number supplied by the network when the PPPoE subscriber logs in. You specify this variable at the **[edit dynamic-profiles *profile-name* interfaces pp0]** hierarchy level for the **unit** statement.
$junos-underlying-interface	Specifies the name of the underlying Ethernet interface on which the router dynamically creates the PPPoE logical interface. The **$junos-underlying-interface** predefined variable is dynamically replaced with the name of the underlying interface supplied by the network when the PPPoE subscriber logs in. You specify this variable at the **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" pppoe-options]** hierarchy level for the **underlying-interface** statement.
Wholesale Networking	
$junos-interface-name	Name of the dynamic interface to which the subscriber access client connects. Its use is in identifying the subscriber interface. You specify this variable at the **[dynamic-profiles *profile-name* routing-instance *$junos-routing-instance*]** hierarchy level for the **interface** statement. The interface name is derived from concatenating the **$junos-interface-ifd-name** and the **$junos-underlying-interface-unit** variables obtained when a subscriber is created dynamically at the **[dynamic-profiles *profile-name* routing-instance *$junos-routing-instance* interface]** hierarchy level.
$junos-routing-instance	Name of the routing instance to which the subscriber is assigned. This variable triggers a return value from the RADIUS server for LSRI-Name (VSA 26–1). You reference this variable in the statement at the **[dynamic-profiles *profile-name*]** hierarchy level for the **routing-instance** statement.

Related Documentation

- Dynamic Variables Overview on page 327
- Configuring Predefined Dynamic Variables in Dynamic Profiles on page 350

Junos Predefined Variables That Correspond to RADIUS Attributes and VSAs

Table 43 on page 341 lists the RADIUS attributes and Juniper Networks VSAs and their corresponding Juniper predefined variables that are used in dynamic profiles. When the router instantiates a dynamic profile following subscriber access, the Junos OS uses the predefined variable to specify the RADIUS attribute or VSA for the information obtained from the RADIUS server.

Table 43: RADIUS Attributes and Corresponding Junos Predefined Variables

RADIUS Attribute or VSA	Junos Predefined Variable	Description	Default Value Support for Junos Predefined Variable
RADIUS Attribute			
Framed-IP-Address (8)	• $junos-framed-route-ip-address	• Address for the client	No
Filter-ID (11)	• $junos-input-filter NOTE: Variable is also used for VSA 26–10.	• Input filter to apply to client IPv4 interface	Yes
Framed-Route (22)	• $junos-framed-route-ip-address-prefix	• (Subattribute 1): Route prefix for access route	No
	• $junos-framed-route-nexthop	• (Subattribute 2): Next hop address for access route	No
	• $junos-framed-route-cost	• (Subattribute 3): Metric for access route	No
	• $junos-framed-route-distance	• (Subattribute 5): Preference for access route	No
	• $junos-framed-route-tag	• (Subattribute 6): Tag for access route	No

Table 43: RADIUS Attributes and Corresponding Junos Predefined Variables *(continued)*

RADIUS Attribute or VSA	Junos Predefined Variable	Description	Default Value Support for Junos Predefined Variable
Framed-IPv6-Route (99)	• $junos-framed-route-ipv6-address-prefix	• (Subattribute 1): Framed IPv6 route prefix configured for the client	No
	• $junos-framed-route-ipv6-nexthop	• (Subattribute 2): IPv6 routing information configured for the client	No
Juniper Networks VSA			
LSRI-Name (26–1)	• $junos-routing-instance	• Routing instance to which subscriber is assigned	No
Ingress-Policy-Name (26–10)	• $junos-input-filter NOTE: Variable is also used for RADIUS attribute 11.	• Input filter to apply to client IPv4 interface	Yes
Egress-Policy-Name (26–11)	• $junos-output-filter	• Output filter to apply to client IPv4 interface	Yes
IGMP-Enable (26–23)	• $junos-igmp-enable	• Enable or disable IGMP on client interface	Yes
IGMP-Access-Group-Name (26–71)	• $junos-igmp-access-group-name	• Access list to use for the group (G) filter	Yes
IGMP-Access-Source-Group-Name (26–72)	• $junos-igmp-access-source-group-name	• Access List to use for the source group (S,G) filter	Yes
MLD-Access-Group-Name (26–74)	• $junos-mld-access-group-name	• Access list to use for the group (G) filter	Yes

Table 43: RADIUS Attributes and Corresponding Junos Predefined Variables *(continued)*

RADIUS Attribute or VSA	Junos Predefined Variable	Description	Default Value Support for Junos Predefined Variable
MLD-Access-Source-Group-Name (26–75)	• $junos-mld-access-source-group-name	• Access List to use for the source group (S,G) filter	Yes
MLD-Version (26–77)	• $junos-mld-version	• MLD protocol version	Yes
IGMP-Version (26–78)	• $junos-igmp-version	• IGMP protocol version	Yes
IGMP-Immediate-Leave (26–97)	• $junos-igmp-immediate-leave	• IGMP immediate leave	Yes
MLD-Immediate-Leave (26–100)	• $junos-mld-immediate-leave	• MLD immediate leave	Yes
IPv6-Ingress-Policy-Name (26–106)	• $junos-input-ipv6-filter	• Input filter to apply to client IPv6 interface	Yes
IPv6-Egress-Policy-Name (26–107)	• $junos-output-ipv6-filter	• Output filter to apply to client IPv6 interface	Yes
CoS-Shaping-Prmt-Type (26–108)	• $junos-cos-scheduler-map	• (T01: Scheduler-map name) Name of scheduler map configured in traffic-control profile	Yes
	• $junos-cos-shaping-rate	• (T02: Shaping rate) Shaping rate configured in traffic-control profile	Yes

Table 43: RADIUS Attributes and Corresponding Junos Predefined Variables *(continued)*

RADIUS Attribute or VSA	Junos Predefined Variable	Description	Default Value Support for Junos Predefined Variable
	• $junos-cos-guaranteed-rate	• (T03: Guaranteed rate) Guaranteed rate configured in traffic-control profile	Yes
	• $junos-cos-delay-buffer-rate	• (T04: Delay-buffer rate) Delay-buffer rate configured in traffic-control profile	Yes
	• $junos-cos-excess-rate	• (T05; Excess rate) Excess rate configured in traffic-control profile	Yes
	• $junos-cos-shaping-mode	• (T07; Shaping mode) CoS shaping mode configured in a dynamic profile	Yes
	• $junos-cos-byte-adjust	• (T08; Byte adjust) Byte adjustments configured for the shaping mode in a dynamic profile	Yes
IPv6-NdRa-Prefix (26–129)	• $junos-ipv6-ndra-prefix	• Prefix value in IPv6 Neighbor Discovery route advertisements	No

Table 43: RADIUS Attributes and Corresponding Junos Predefined Variables *(continued)*

RADIUS Attribute or VSA	Junos Predefined Variable	Description	Default Value Support for Junos Predefined Variable
CoS-Interface-Set-Name (26–130)	• $junos-interface-set-name	• Name of an interface set configured in a dynamic profile	Yes
CoS-Scheduler-Pmt-Type (26–146)	• $junos-cos-scheduler	• (Null: Scheduler name) Name of scheduler configured in a dynamic profile	Yes
	• $junos-cos-scheduler-tx	• (T01: CoS scheduler transmit rate) Transmit rate for scheduler configured in a dynamic profile	Yes Available for multiple parameters: • Percent • Rate
	• $junos-cos-scheduler-bs	• (T02: CoS scheduler buffer size) Buffer size for scheduler configured in a dynamic profile	Yes Available for multiple parameters: • Percent • Temporal
	• $junos-cos-scheduler-pri	• (T03: CoS scheduler priority) Packet-scheduling priority for scheduler configured in a dynamic profile	Yes

Table 43: RADIUS Attributes and Corresponding Junos Predefined Variables *(continued)*

RADIUS Attribute or VSA	Junos Predefined Variable	Description	Default Value Support for Junos Predefined Variable
	• $junos-cos-scheduler-dropfile-low	• (T04: CoS scheduler drop-profile low) Name of drop profile for RED loss-priority level **low** for scheduler configured in a dynamic profile	Yes
	• $junos-cos-scheduler-dropfile-medium-low	• (T05: CoS scheduler drop-profile medium-low) Name of drop profile for RED loss-priority level **medium-low** for scheduler configured in a dynamic profile	Yes
	• $junos-cos-scheduler-dropfile-medium-high	• (T06: CoS scheduler drop-profile medium-high) Name of drop profile for RED loss-priority level **medium-high** for scheduler configured in a dynamic profile	Yes

Table 43: RADIUS Attributes and Corresponding Junos Predefined Variables *(continued)*

RADIUS Attribute or VSA	Junos Predefined Variable	Description	Default Value Support for Junos Predefined Variable
	• $junos-cos-scheduler-dropfile-high	• (T07: CoS scheduler drop-profile high) Name of drop profile for RED loss-priority level **high** for scheduler configured in a dynamic profile	Yes
	• $junos-cos-scheduler-dropfile-any	• (T08: CoS scheduler drop-profile any) Name of drop profile for RED loss-priority level **any** for scheduler configured in a dynamic profile	Yes
	• $junos-cos-scheduler-excess-rate	• (T09: CoS scheduler excess rate) Excess rate configured for a scheduler in a dynamic profile	Yes Available for multiple parameters: • Percent • Proportion
	• $junos-cos-scheduler-shaping-rate	• (T10: CoS scheduler shaping rate) Shaping rate configured for a scheduler in a dynamic profile	Yes Available for multiple parameters: • Percent • Rate

Table 43: RADIUS Attributes and Corresponding Junos Predefined Variables *(continued)*

RADIUS Attribute or VSA	Junos Predefined Variable	Description	Default Value Support for Junos Predefined Variable
	• $junos-cos-scheduler-excess-priority	• (T11: CoS scheduler excess priority) Excess priority configured for a scheduler in a dynamic profile	Yes

Related Documentation

- Dynamic Variables Overview on page 327
- Configuring Predefined Dynamic Variables in Dynamic Profiles on page 350
- Junos Predefined Variables on page 328

User-Defined Variables

Junos OS enables you to configure variables at the **[dynamic-profiles *profile-name* variables]** hierarchy level and associate those variables with supported RADIUS VSAs. The dynamic profile obtains and replaces data for these variables from an external server (for example, from RADIUS authentication and authorization VSAs) during the subscriber authentication process. At run time, the variables are replaced by these actual values (obtained from default information on the router or from the RADIUS server) and are used to configure the subscriber interface.

For a complete list of supported RADIUS VSAs for which you can create variable associations, see “RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework” on page 38.

You can also configure the user-defined variables with a default value. The default value provides a standalone configuration for the associated statement or a backup for the statement configuration if the RADIUS server is inaccessible or the VSA attribute does not contain a value.

Related Documentation

- Dynamic Profiles Overview on page 325
- Configuring User-Defined Dynamic Variables in Dynamic Profiles on page 352
- RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework on page 38
- Junos Predefined Variables on page 328

CHAPTER 31

Configuring Dynamic Profiles

Configuring a Basic Dynamic Profile

This topic describes how to create a basic dynamic profile. A basic profile must contain a profile name and have both an interface variable name (such as **$junos-interface-ifd-name**) included at the **[edit dynamic-profiles *profile-name* interfaces** hierarchy level and logical interface variable name (such as **$junos-underlying-interface-unit** or **$junos-interface-unit**) at the **[edit dynamic-profiles *profile-name* interfaces *variable-interface-name* unit]** hierarchy level.

Before you configure dynamic profiles for initial client access:

1. Configure the necessary router interfaces that you want DHCP clients to use when accessing the network.

   See “Subscriber Interface Overview” on page 391 for information about the types of interfaces you can use with dynamic profiles and how to configure them.

2. Configure all RADIUS values that you want the profiles to use when validating DHCP clients for access to the multicast network.

   See “Configuring RADIUS Server Parameters for Subscriber Access” on page 26

To configure a basic dynamic profile:

1. Name the profile.

   ```
   [edit]
   user@host# edit dynamic-profiles basic-profile
   ```

2. Define the **interface-name** statement with the internal **$junos-interface-ifd-name** variable used by the router to match the interface name of the receiving interface.

```
[edit dynamic-profiles basic-profile]
user@host# edit interfaces $junos-interface-ifd-name
```

3. Define the **unit** statement with the internal variable:

   - When referencing an existing interface, specify the **$junos-underlying-interface-unit** variable used by the router to match the unit value of the receiving interface.
   - When creating dynamic interfaces, specify the **$junos-interface-unit** variable used by the router to generate a unit value for the interface.

   ```
   [edit dynamic-profiles basic-profile interfaces "$junos-interface-ifd-name"]
   user@host# set unit $junos-underlying-interface-unit
   ```

   or

   ```
   [edit dynamic-profiles basic-profile interfaces "$junos-interface-ifd-name"]
   user@host# set unit $junos-interface-unit
   ```

Related Documentation

- Configuring a Dynamic Profile for Client Access on page 353
- Configuring a Dynamic Profile for Various Levels of Services on page 355
- Configuring Predefined Dynamic Variables in Dynamic Profiles on page 350
- Configuring Static Subscriber Interfaces in Dynamic Profiles on page 397
- Configuring VLAN Dynamic Profiles on page 367
- Dynamic Profiles Overview on page 325
- Dynamic Variables Overview on page 327
- Junos Predefined Variables on page 328
- Example: Firewall Dynamic Profile on page 360
- Example: IGMP Dynamic Profile on page 359

Configuring Predefined Dynamic Variables in Dynamic Profiles

This topic discusses how to configure predefined variables in a dynamic profile. The dynamic profile obtains and replaces data for these variables from an incoming client data packet. You can specify these variables in the body of a dynamic profile without having to first define the variables at the **[edit dynamic-profiles *profile-name* variables]** hierarchy level.

Before you configure dynamic variables:

1. Create a basic dynamic profile.

   See “Configuring a Basic Dynamic Profile” on page 349.

2. Ensure that the router hardware is configured in the network to accept subscriber access.

To configure predefined variables in a dynamic profile:

1. Access the desired dynamic profile.

   ```
   [edit]
   user@host# edit dynamic-profiles igmpProfile1
   [edit dynamic-profiles igmpProfile1]
   ```

2. Configure the necessary variables.

   ```
   [edit dynamic-profiles igmpProfile1]
   user@host# set protocols igmp interface $junos-interface-name
   ```

   For a complete list of supported predefined variables, see "Junos Predefined Variables" on page 328.

Related Documentation

- Configuring a Basic Dynamic Profile on page 349
- Configuring User-Defined Dynamic Variables in Dynamic Profiles on page 352
- Dynamic Profiles Overview on page 325
- Dynamic Variables Overview on page 327
- Junos Predefined Variables on page 328
- Example: Firewall Dynamic Profile on page 360
- Example: IGMP Dynamic Profile on page 359

Configuring Default Values for Predefined Variables in a Dynamic Profile

You can configure default values for the predefined variables that are configured in a dynamic profile. These default values are used when RADIUS does not supply a value.

To configure default values for Junos predefined variables:

1. Specify that you want to configure the dynamic profile.

   ```
   [edit]
   user@host# edit dynamic-profile profile-name
   ```

2. Configure the default value for the predefined variable.

   ```
   [edit dynamic-profiles profile-name]
   user@host# set predefined-variable-defaults predefined-variable variable-option
     default-value
   ```

NOTE: Do not use the "junos-" prefix when specifying the *predefined-variable*.

Related Documentation

- For a list of variables for which you can configure default values, see Junos Predefined Variables That Correspond to RADIUS Attributes and VSAs on page 341
- Junos Predefined Variables on page 328

- Dynamic Variables Overview on page 327

Configuring User-Defined Dynamic Variables in Dynamic Profiles

This topic discusses how to configure the user-defined dynamic variables in a dynamic profile. You define user-defined variables for individual dynamic profiles at the **[edit dynamic-profiles *profile-name* variables]** hierarchy level. At this hierarchy level, you create an association between a variable call value (for example, $junos-igmp-version) that appears in the body of the dynamic profile and data associated with that call value that is managed in an externally configured server (for example, a RADIUS VSA managed on a RADIUS server) or defined as a default value in the **variables** stanza.

Before you configure dynamic variables:

1. Create a basic dynamic profile.

   See “Configuring a Basic Dynamic Profile” on page 349.

2. Ensure that the router is configured to enable communication between the client and the RADIUS server.

   See “Specifying the Authentication and Accounting Methods for Subscriber Access” on page 20.

3. Configure all RADIUS values that you want the profiles to use when validating subscribers.

   See “Configuring RADIUS Server Parameters for Subscriber Access” on page 26

To configure variables in a dynamic profile:

1. Access the **variables** stanza in the desired dynamic profile.

   ```
   user@host# edit dynamic-profiles profile1 variables
   [edit dynamic-profiles profile1 variables]
   ```

2. Specify a name to identify the variable.

   The variable name can be any alphanumeric value. The name is an association to a variable in the dynamic profile configuration. For example, if you specify a variable name of “igmp-version” as the variable name, you must specify the call variable “$igmp-version” in the dynamic profile configuration for the statement you want the variable to define.

   ```
   [edit dynamic-profiles igmpProfile1 variables]
   user@host# set igmp-version
   ```

3. Configure the variable using one (or both) of the following methods:

   - Specify a RADIUS attribute and RADIUS tag (when required) for the variable.

     ```
     [edit dynamic-profiles igmpProfile1 variables]
     user@host# set igmp-version radius vendor-id 4874 attribute 78
     ```

   - Configure a default value for the variable.

     ```
     [edit dynamic-profiles igmpProfile1 variables]
     ```

```
user@host# set igmp-version default-value 3
```

NOTE: You can configure variables by either using the RADIUS method, the default value method, or both. If you choose to configure both a RADIUS attribute and a default value for the variable, the RADIUS attribute takes precedence over the default value. However, the dynamic profile applies the default value if the router cannot contact the RADIUS server or if the RADIUS server does not contain a value for the assigned attribute.

4. Configure the call variable in the dynamic profile.

```
[edit dynamic-profiles igmpProfile1]
user@host# set protocols igmp interface demux0 version $igmp-version
```

NOTE: The call variable must match the name of the variable that you configured in the variables stanza.

Related Documentation

- Dynamic Profiles Overview on page 325
- Dynamic Variables Overview on page 327
- Configuring a Basic Dynamic Profile on page 349
- User-Defined Variables on page 348
- Configuring Predefined Dynamic Variables in Dynamic Profiles on page 350
- Example: Configuring Dynamic Hierarchical Scheduling and Queuing for Subscriber Access on page 647
- Example: Firewall Dynamic Profile on page 360
- Example: IGMP Dynamic Profile on page 359

Configuring a Dynamic Profile for Client Access

This topic describes how to create a basic dynamic profile that enables DHCP clients to dynamically access the multicast network.

Before you configure dynamic profiles for initial client access:

1. Create a basic dynamic profile.

   See “Configuring a Basic Dynamic Profile” on page 349.

2. Configure the necessary router interfaces that you want accessing DHCP clients to use.

   See “Subscriber Interface Overview” on page 391 for information about the types of interfaces you can use with dynamic profiles and how to configure them.

3. Ensure that the router is configured to enable communication between the client and the RADIUS server.

   See “Specifying the Authentication and Accounting Methods for Subscriber Access” on page 20.

4. Configure all RADIUS values that you want the profiles to use when validating DHCP clients for access to the multicast network.

   See “Configuring RADIUS Server Parameters for Subscriber Access” on page 26

To configure an initial client access dynamic profile:

1. Access an IGMP access profile.

   ```
   user@host# edit dynamic-profiles access-profile
   [edit dynamic-profiles access-profile]
   user@host#
   ```

2. Define the IGMP interface with the interface variable.

   NOTE: The variable value is replaced by the name of the interface over which the router received the DHCP message.

   ```
   [edit dynamic-profiles access-profile]
   user@host# set protocols igmp interface $junos-interface-name
   ```

3. (Optional) Enable accounting on the IGMP interface.

   ```
   [edit dynamic-profiles access-profile protocols igmp interface
     “$junos-underlying-interface”]
   user@host# set accounting
   ```

4. Set the IGMP interface to remain enabled.

   ```
   [edit dynamic-profiles access-profile protocols igmp interface
     “$junos-underlying-interface”]
   user@host# set disable:$junos-igmp-enable
   ```

   NOTE: RADIUS is capable of disabling IGMP. By assigning the enable variable to the disable statement, you can ensure that IGMP remains enabled.

5. (Optional) Specify a group policy for the IGMP interface.

   ```
   [edit dynamic-profiles access-profile protocols igmp interface
     “$junos-underlying-interface”]
   user@host# set group-policy report-reject-policy
   ```

6. (Optional) Enable immediate leave on the IGMP interface.

   ```
   [edit dynamic-profiles access-profile protocols igmp interface
     “$junos-underlying-interface”]
   user@host# set immediate-leave:$junos-igmp-immediate-leave
   ```

7. (Optional) Disable the collection of IGMP join and leave even statistics on the IGMP interface.

```
[edit dynamic-profiles access-profile protocols igmp interface
  “$junos-underlying-interface”]
user@host# set no-accounting
```

8. (Optional) Set the IGMP interface to obtain the IGMP version from RADIUS.

```
[edit dynamic-profiles access-profile protocols igmp interface
  $junos-underlying-interface]
user@host# set version $junos-igmp-version
```

Related Documentation

- Configuring a Basic Dynamic Profile on page 349
- Dynamic Profiles Overview on page 325

Configuring a Dynamic Profile for Various Levels of Services

This topic discusses how to create dynamic profiles to define various levels of service for DHCP clients.

Before you configure dynamic profiles for client services:

1. Create a basic dynamic profile.

   See “Configuring a Basic Dynamic Profile” on page 349.

2. Configure a dynamic profile that enables DHCP clients access to the network.

   See “Configuring a Dynamic Profile for Client Access” on page 353

NOTE: You can create a basic dynamic profile that contains both access configuration and some level of basic service.

3. Ensure that the router is configured to enable communication between the client and the RADIUS server.

   See “Specifying the Authentication and Accounting Methods for Subscriber Access” on page 20.

4. Configure all RADIUS values that you want the profiles to use when validating DHCP clients.

   See “Configuring RADIUS Server Parameters for Subscriber Access” on page 26

To configure an initial client access dynamic profile:

1. Access the desired service profile.

```
user@host# set dynamic-profiles basic-service-profile
```

2. (Optional) Define any IGMP protocols values as described for creating a basic access profile to combine a basic service with access in a profile.

See “Configuring a Dynamic Profile for Client Access” on page 353.

3. (Optional) Specify any filters for the interface.

   See “Dynamically Attaching Statically Created Filters for Any Interface Type” on page 504, “Dynamically Attaching Statically Created Filters for a Specific Interface Family Type” on page 503, or “Dynamically Attaching Filters Using RADIUS Variables” on page 505.

4. Define any CoS values for the service level you want this profile to configure on the interface.

Related Documentation

- Configuring a Basic Dynamic Profile on page 349
- Dynamic Profiles Overview on page 325

Modifying Dynamic Profiles

You use dynamic profiles to configure large groups of subscribers. However, after you have configured and applied dynamic profiles, use caution when modifying any dynamic profiles that are in use by active subscribers on the router. This section provides guidelines and procedures for modifying existing profiles and applying them to subscriber interfaces.

When modifying dynamic profiles, keep the following considerations in mind:

- Do not modify a dynamic profile when it is in use by active subscribers.
- Modifying a dynamic profile when it is in use by active subscribers can lead to unpredictable behavior.

When a dynamic profile is modified and committed, the router:

1. Logs a warning that the profiles are being modified and committed.
2. Determines whether the profile is currently being use by any subscriber.
3. If the profile is in use by a subscriber, the commit fails and the router logs errors to report the conflict.

To properly modify a dynamic profile:

1. Ensure that no subscribers are using the dynamic profile.
2. Create a new dynamic profile with a different name that contains the desired changes:

   Original Profile

```
profile1 {
    interfaces {
        "$junos-interface-ifd-name" {
            unit "$junos-underlying-interface-unit" {
                family inet {
                    filter {
                        input "$junos-input-filter";
                    }
                }
```

```
        }
      }
    }
  }
```

Original DHCP Configuration

```
forwarding-options {
  dhcp-relay {
    traceoptions {
      flag all;
    }
    .......
    dynamic-profile profile1;
    ........
  }
}
```

New Profile

```
profile2 {
  interfaces {
    "$junos-interface-ifd-name" {
      unit "$junos-underlying-interface-unit" {
        family inet {
          filter {
            input "$junos-input-filter";
            output "$junos-output-filter; /* added output filter variable */
          }
        }
      }
    }
  }
}
```

Modified DHCP Configuration

```
forwarding-options {
  dhcp-relay {
    traceoptions {
      flag all;
    }
    .......
    dynamic-profile profile2; /* Name changed from profile1 */
    ........
  }
}
```

3. Commit the configuration containing the modified profile.

   The modified profile is used for any new subscribers that access the router.

Related Documentation

- Configuring a Basic Dynamic Profile on page 349
- Dynamic Profiles Overview on page 325

CHAPTER 32

Dynamic Profile Examples

Example: IGMP Dynamic Profile

In this example, IGMP is configured for subscriber access using Junos predefined variables.

The predefined variables equate to RADIUS settings as follows:

Junos Predefined Variable	RADIUS VSA Name	RADIUS Attribute Number
$var-igmp-version	IGMP-Version	26–78
$var-igmp-access-grp	IGMP-Access-Group-Name	26–71
$var-igmp-access-src-grp	IGMP-Access-Source- Group-Name	26–72

```
[edit dynamic-profiles profile-name]
interfaces {
   demux0 {
      unit "$junos-interface-unit" {
         demux-options {
            underlying-interface "$junos-underlying-interface";
         }
         family inet {
            demux-source {
               “$junos-subscriber-ip-address”;
            }
            unnumbered-address lo0.0 preferred-source-address 20.21.0.1;
         }
      }
   }
}
protocols {
   igmp {
```

```
    interface "$junos-interface-name" {
      version "$var-igmp-version";
      group-policy [ "$var-igmp-access-grp" "$var-igmp-access-src-grp" ];
    }
  }
}
```

NOTE: You must also configure any global IGMP parameters.

Example: Firewall Dynamic Profile

In this example, dynamic firewall is configured for subscriber access using Junos IPv4 predefined variables.

The predefined variables equate to RADIUS settings as follows:

Junos Predefined Variable	RADIUS VSA Name	RADIUS Attribute Number
$junos-input-filter	Ingress-Policy-Name	26–10
$junos-output-filter	Egress-Policy-Name	26–11

```
dynamic-profiles {
  DynamicFilterProfile {
    interfaces {
      “$junos-interface-ifd-name” {
        unit “$junos-underlying-interface-unit” {
          family inet {
            filter {
              input “$junos-input-filter”;
              output “$junos-output-filter”;
            }
          }
        }
      }
    }
  }
}
```

NOTE: You must also configure any global firewall parameters.

Example: Minimum MLPPP Dynamic Profile

This example shows the minimum configuration for a dynamic profile that is used for static LSQ MLPPP bundle interfaces.

```
dynamic-profiles {
  mlppp-profile-1 {
    interfaces {
```

```
        "$junos-interface-ifd-name" {
          unit "$junos-underlying-interface-unit";
        }
      }
    }
  }
```

Related Documentation

- Dynamic Profiles for PPP Subscriber Interfaces Overview on page 197
- Attaching Dynamic Profiles to MLPPP Bundles on page 207

Example: Minimum PPPoE Dynamic Profile

This example shows the minimum configuration for a dynamic profile that is used for static PPPoE interfaces. The configuration must include the **interface pp0** stanza.

```
dynamic-profiles {
  ppp-profile-1 {
    interfaces {
      pp0 {
        unit "$junos-interface-unit";
      }
    }
  }
}
```

Related Documentation

- Dynamic Profiles for PPP Subscriber Interfaces Overview on page 197
- Configuring Dynamic Authentication for PPP Subscribers on page 199
- Attaching Dynamic Profiles to Static PPP Subscriber Interfaces on page 203

Example: Subscriber Secure Policy Dynamic Profile

In this example, subscriber secure policy mirroring is configured for subscriber access using user-defined variables and Junos predefined variables. This example is for the flow-tap service configured on a router without a Tunnel Services PIC.

The user-defined variables equate to RADIUS settings as follows:

User-Defined Variable Name	Junos Variable	RADIUS VSA Name	RADIUS Attribute Number	Example RADIUS Setting
ssp-intercept-id	$ssp-intercept-id	Interception Identifier	26–59	subscriber-bg–2350
ssp-destination-addr	$ssp-destination-addr	MD-IP-Address	26–60	192.163.100.22
ssp-destination-port	$ssp-destination-port	MD-Port-Number	26–61	2222

```
variables {
  var ssp-intercept-id;
  var ssp-destination-addr;
```

```
var ssp-destination-port;
}
interfaces {
   <*> {
      unit <*> {
         family inet {
            filter {
               input ssp;
               output ssp;
            }
         }
      }
   }
}
firewall {
   family inet {
      filter ssp {
         term $ssp-id {
            from {
               # optional classifiers.
            }
            then {
               flowtap-destination-address $ssp-destination-addr;
               flowtap-destination-port $ssp-destination-port;
               flowtap;
            }
         }
      }
   }
}
```

PART 10

Dynamic VLANs

CHAPTER 33

Dynamic VLAN Overview

Dynamic 802.1Q VLAN Overview

You can identify VLANs statically or dynamically.

For Ethernet, Fast Ethernet, Tri-Rate Ethernet copper, Gigabit Ethernet, 10-Gigabit Ethernet, and aggregated Ethernet interfaces supporting VPLS, the Junos OS supports a subset of the IEEE 802.1Q standard for channelizing an Ethernet interface into multiple logical interfaces. Many hosts can be connected to the same Gigabit Ethernet switch, but they cannot be in the same routing or bridging domain.

To identify VLANs statically, you can reference a static VLAN interface in a dynamic profile. To identify subscribers dynamically, you use a variable to specify an 802.1Q VLAN that is dynamically created when a subscribers accesses the network.

Static VLAN Configuration

Static VLAN configuration is not described in this guide. For information about how to statically configure VLANs and stacked VLANs, see the *Junos OS Network Interfaces Configuration Guide*. For an example of how to configure static VLANs in a subscriber access network, see the *Junos OS Broadband Subscriber Management Solutions Guide*.

Dynamic VLAN Configuration

You can configure the router to dynamically create VLANs when a client accesses an interface and requests a VLAN ID that does not yet exist. When a client accesses a particular interface, the router instantiates a VLAN dynamic profile that you have associated with the interface. Using the settings in the dynamic profile, the router extracts information about the client from the incoming packet (for example, the interface and unit values), saves this information in the routing table, and creates a VLAN or stacked VLAN ID for the client from a range of VLAN IDs that you configure for the interface.

NOTE: Dynamic VLAN configuration supports the creation of IPv4 (inet), DHCPv4, IPv6 (inet6), and DHCPv6 VLANs.

Dynamically configuring VLANs or stacked VLANs requires the following general steps:

1. Configure a dynamic profile for dynamic VLAN or dynamic stacked VLAN creation.

   See “Configuring VLAN Dynamic Profiles” on page 367.

2. Associate the VLAN or stacked VLAN dynamic profile with the interface.

   See “Configuring VLAN Interfaces to Use Dynamic Profiles” on page 374.

3. Specify the Ethernet packet type that the VLAN dynamic profile accepts.

   See “Configuring Which VLAN Ethernet Packet Types Dynamic Profiles Can Accept” on page 375.

4. Define VLAN ranges for use by the dynamic profile when creating VLAN IDs.

   See “Configuring VLAN Ranges for Use with Dynamic Profiles” on page 377.

CHAPTER 34

Configuring Dynamic VLANs

Configuring VLAN Dynamic Profiles

Creating dynamic single-tag VLANs or stacked (dual-tag) VLANs requires the use of dynamic profiles. The dynamic profile automatically references the VLAN interface and creates the interface unit and the necessary VLAN IDs for each new single-tag VLAN or stacked VLAN.

NOTE: VLAN dynamic profiles do not support user-defined variables. Use only Junos VLAN predefined variables when configuring VLAN dynamic profiles. See "Dynamic Variables Overview" on page 327 for information about dynamic variables.

Configuring a VLAN Dynamic Profile for Creating Single-Tag VLANs Using Standard TPID Values

You can configure a VLAN dynamic profile to create single-tag VLANs that accept only standard TPID values (a TPID value of 0x8100) by using use the **vlan-id** statement and the **$junos-vlan-id** variable.

NOTE: This procedure configures a dynamic profile that accepts only TPID values of 0x8100. To configure a VLAN dynamic profile for creating VLANs using any TPID values, see "Configuring a VLAN Dynamic Profile for Creating Single-Tag VLANs Using Any TPID Values" on page 369.

Before you begin:

- Configure the dynamic profile.

  See "Configuring a Basic Dynamic Profile" on page 349.

To configure a dynamic VLAN profile:

1. Ensure that the VLAN dynamic profile uses the **$junos-interface-ifd-name** variable for the dynamic interface and the **$junos-interface-unit** variable for the interface unit.
2. (Optional) To support dynamic demux interfaces, enable them using the **demux-source** statement.
   a. For IPv4 demux interfaces, specify **inet** as the source type.

      ```
      [edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
        "$junos-interface-unit"]
      user@host# set demux-source inet
      ```

   b. For IPv6 demux interfaces, specify **inet6** as the source type.

      ```
      [edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
        "$junos-interface-unit"]
      user@host# set demux-source inet6
      ```

3. (Optional) To configure the router to respond to any ARP request, specify the **proxy-arp** statement.

   ```
   [edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
     "$junos-interface-unit"]
   user@host# set proxy-arp
   ```

4. Specify that you want to use dynamic VLAN IDs in the dynamic profile.

   ```
   [edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
     "$junos-interface-unit"]
   user@host# set vlan-id $junos-vlan-id
   ```

   When the dynamic profile is instantiated, the variable is dynamically replaced with a VLAN ID within the VLAN range specified at the **[interfaces]** hierarchy level.

5. Define the unit family type.
   a. For IPv4 interfaces, specify the **inet** family type.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit"]
user@host# set family inet
```

b. For IPv6 interfaces, specify the **inet6** family type.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit"]
user@host# set family inet6
```

6. (Optional) Enable IP and MAC address validation for dynamic demux interfaces in a dynamic profile.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit" family inet]
user@host# set mac-validate strict
```

7. Specify the unnumbered address.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit" family inet]
user@host# set unnumbered-address (Dynamic Profiles) lo.0
```

8. Specify the preferred source address.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit" family inet]
user@host# set preferred-source-address 192.0.16.1
```

Configuring a VLAN Dynamic Profile for Creating Single-Tag VLANs Using Any TPID Values

You can configure a VLAN dynamic profile to create single-tag VLANs that accept any TPID values by configuring the **vlan-tags** statement and the **$junos-vlan-id** variable.

NOTE: For procedures to configure a VLAN dynamic profile for creating single-tag VLANs that use only standard TPID values (a TPID value of 0x8100), see “Configuring a VLAN Dynamic Profile for Creating Single-Tag VLANs Using Standard TPID Values” on page 368.

Before you begin:

- Configure the dynamic profile.

  See “Configuring a Basic Dynamic Profile” on page 349.

To configure a dynamic VLAN profile:

1. Ensure that the VLAN dynamic profile uses the **$junos-interface-ifd-name** variable for the dynamic interface and the **$junos-interface-unit** variable for the interface unit.
2. (Optional) To support dynamic demux interfaces, enable them using the **demux-source** statement.

   a. For IPv4 demux interfaces, specify **inet** as the source type.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit"]
user@host# set demux-source inet
```

b. For IPv6 demux interfaces, specify **inet6** as the source type.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit"]
user@host# set demux-source inet6
```

3. (Optional) To configure the router to respond to any ARP request, specify the **proxy-arp** statement.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit"]
user@host# set proxy-arp
```

4. Specify that you want to use dynamic VLAN IDs in the dynamic profile.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit"]
user@host# set vlan-tags outer $junos-vlan-id
```

The variable is dynamically replaced with both the TPID value and a VLAN ID within the VLAN range specified at the **[interfaces]** hierarchy level.

5. Define the unit family type.

a. For IPv4 interfaces, specify the **inet** family type.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit"]
user@host# set family inet
```

b. For IPv6 interfaces, specify the **inet6** family type.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit"]
user@host# set family inet6
```

6. (Optional) Enable IP and MAC address validation for dynamic demux interfaces in a dynamic profile.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit" family inet]
user@host# set mac-validate strict
```

7. Specify the unnumbered address.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit" family inet]
user@host# set unnumbered-address (Dynamic Profiles) lo.0
```

8. Specify the preferred source address.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit" family inet]
user@host# set preferred-source-address 192.0.16.1
```

Configuring a Stacked VLAN Dynamic Profile

You can configure a dynamic profile for creating stacked 802.1Q VLANs.

Before you begin:

- Configure the dynamic profile.

  See "Configuring a Basic Dynamic Profile" on page 349.

To configure a stacked VLAN dynamic profile:

1. Ensure that the VLAN dynamic profile uses the **$junos-interface-ifd-name** variable for the dynamic interface and the **$junos-interface-unit** variable for the interface unit.
2. (Optional) To support dynamic demux interfaces, enable them using the **demux-source** statement.
   a. For IPv4 demux interfaces, specify **inet** as the source type.

      ```
      [edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
        "$junos-interface-unit"]
      user@host# set demux-source inet
      ```

   b. For IPv6 demux interfaces, specify **inet6** as the source type.

      ```
      [edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
        "$junos-interface-unit"]
      user@host# set demux-source inet6
      ```

3. (Optional) To configure the router to respond to any ARP request, specify the **proxy-arp** statement.

   ```
   [edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
     "$junos-interface-unit"]
   user@host# set proxy-arp
   ```

4. Specify the outer VLAN ID variable.

   ```
   [edit dynamic-profiles STACKED-VLAN-PROF1 interfaces "$junos-interface-ifd-name"
     unit "$junos-interface-unit"]
   user@host# set vlan-tags outer $junos-stacked-vlan-id
   ```

   The variable is dynamically replaced with an outer VLAN ID within the VLAN range specified at the **[interfaces]** hierarchy level.

5. Specify the inner VLAN ID variable.

   ```
   [edit dynamic-profiles STACKED-VLAN-PROF1 interfaces "$junos-interface-ifd-name"
     unit "$junos-interface-unit"]
   user@host# set vlan-tags inner $junos-vlan-id
   ```

   The variable is dynamically replaced with an inner VLAN ID within the VLAN range specified at the **[interfaces]** hierarchy level.

6. Define the unit family type.
   a. For IPv4 interfaces, specify the **inet** family type.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit"]
user@host# set family inet
```

b. For IPv6 interfaces, specify the **inet6** family type.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit"]
user@host# set family inet6
```

7. (Optional) Enable IP and MAC address validation for dynamic demux interfaces in a dynamic profile.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit" family inet]
user@host# set mac-validate strict
```

8. Specify the unnumbered address.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit" family inet]
user@host# set unnumbered-address (Dynamic Profiles) lo.0
```

9. Specify the preferred source address.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit" family inet]
user@host# set preferred-source-address 192.0.16.1
```

Configuring a VLAN Dynamic Profile That Associates VLAN Interfaces with Separate Routing Instances

You can configure a VLAN dynamic profile that dynamically creates underlying VLAN interfaces and associates these interfaces with dynamically-created routing instances. The VLAN interface is created in the default logical system (LS) for a specific routing instance as defined by VSA 26–1 (LSRI-Name) on the AAA server (for example, RADIUS server).

To configure a dynamic VLAN profile using routing instances:

1. Name the profile.

```
[edit]
user@host# edit dynamic-profiles VLAN_PROFILE_RI
```

2. Specify that you want to dynamically create routing instances on the default logical system.

```
[edit dynamic-profiles VLAN_PROFILE_RI]
user@host# edit routing-instances $junos-routing-instance
```

3. Define the routing instance **interface** statement with the internal **$junos-interface-name** variable used by the router to match the interface name of the receiving interface.

```
[edit dynamic-profiles VLAN_PROFILE_RI routing-instances “$junos-routing-instance”]
user@host# set interface $junos-interface-name
```

4. Define the dynamic profile **interfaces** statement with the internal **$junos-interface-ifd-name** variable.

```
[edit dynamic-profiles VLAN_PROFILE_RI]
user@host# edit interfaces $junos-interface-ifd-name
```

5. Define the **unit** statement with the internal **$junos-interface-unit** variable used by the router to generate a unit value for the interface.

```
[edit dynamic-profiles VLAN_PROFILE_RI interfaces "$junos-interface-ifd-name"]
user@host# edit unit $junos-interface-unit
```

6. To support dynamic demux interfaces, enable them using the **demux-source** statement.

   a. For IPv4 demux interfaces, specify **inet** as the source type.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit"]
user@host# set demux-source inet
```

   b. For IPv6 demux interfaces, specify **inet6** as the source type.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit"]
user@host# set demux-source inet6
```

7. (Optional) To configure the router to respond to any ARP request, specify the **proxy-arp** statement.

```
[edit dynamic-profiles VLAN_PROFILE_RI interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit"]
user@host# set proxy-arp
```

8. Specify that you want to use dynamic VLAN IDs in the dynamic profile.

```
[edit dynamic-profiles VLAN_PROFILE_RI interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit"]
user@host# set vlan-id $junos-vlan-id
```

   The variable is dynamically replaced with both the TPID value and a VLAN ID within the VLAN range specified at the **[interfaces]** hierarchy level.

9. Define the unit family type.

   a. For IPv4 interfaces, specify the **inet** family type.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit"]
user@host# set family inet
```

   b. For IPv6 interfaces, specify the **inet6** family type.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit"]
user@host# set family inet6
```

10. (Optional) Enable IP and MAC address validation for dynamic demux interfaces in a dynamic profile.

```
[edit dynamic-profiles VLAN_PROFILE_RI interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit" family inet]
user@host# set mac-validate strict
```

11. Specify the unnumbered address to dynamically create loopback interfaces.

```
[edit dynamic-profiles VLAN_PROFILE_RI interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit" family inet]
user@host# set unnumbered-address (Dynamic Profiles) $junos-loopback-interface
```

12. (Optional) Specify the preferred source address.

```
[edit dynamic-profiles VLAN-PROF1 interfaces "$junos-interface-ifd-name" unit
  "$junos-interface-unit" family inet]
user@host# set preferred-source-address 192.0.16.1
```

Configuring VLAN Interfaces to Use Dynamic Profiles

You can configure an interface to use a single-tag VLAN or stacked (dual-tag) VLAN dynamic profile when creating dynamic VLANs. The dynamic profile assigns a VLAN ID to each VLAN dynamically created over the interface by using the single-tag VLAN and stacked VLAN ranges configured for the VLAN interface. You can configure VLAN interfaces to use dynamic profiles in the following ways:

- Associating a Single-Tag VLAN Dynamic Profile with an Interface on page 374
- Associating a Stacked VLAN Dynamic Profile with an Interface on page 374

Associating a Single-Tag VLAN Dynamic Profile with an Interface

Before you begin:

- Configure the VLAN dynamic profile.

  See “Configuring a Basic Dynamic Profile” on page 349.

To associate a single-tag VLAN dynamic profile with an interface:

1. Access the interface that you want to use for creating VLANs.

```
[edit]
user@host# edit interfaces ge-1/0/0
```

2. Edit the **auto-configure** stanza to automatically configure VLANs.

```
[edit interfaces ge-1/0/0]
user@host# edit auto-configure
```

3. Edit the **vlan-ranges** stanza.

```
[edit interfaces ge-1/0/0 auto-configure]
user@host# edit vlan-ranges
```

4. Specify the dynamic VLAN profile that you want the interface to use.

```
[edit interfaces ge-1/0/0 auto-configure vlan-ranges]
user@host# set dynamic-profile VLAN-PROF1
```

Associating a Stacked VLAN Dynamic Profile with an Interface

To associate a stacked (dual-tag) VLAN dynamic profile with an interface:

1. Access the interface that you want to use for creating VLANs.

```
[edit interfaces]
```

```
user@host# edit interfaces ge-1/0/0
```

2. Edit the **auto-configure** stanza to automatically configure the stacked VLANs.

```
[edit interfaces ge-1/0/0]
user@host# edit auto-configure
```

3. Edit the **stacked-vlan-ranges** stanza.

```
[edit interfaces ge-1/0/0 auto-configure]
user@host# edit stacked-vlan-ranges
```

4. Specify the dynamic VLAN profile that you want the interface to use.

```
[edit interfaces ge-1/0/0 auto-configure stacked-vlan-ranges]
user@host# set dynamic-profile STACKED-VLAN-PROF1
```

Configuring Which VLAN Ethernet Packet Types Dynamic Profiles Can Accept

To create dynamic single-tag VLANs and dynamic stacked (dual-tag) VLANs, you must specify what Ethernet packet type you want the single-tag VLAN or stacked VLAN dynamic profile to accept. You can configure which VLAN Ethernet packet types a dynamic profile accepts in the following ways:

- Configuring the VLAN Ethernet Packet Type for Single-Tag VLAN Dynamic Profiles on page 375
- Configuring the VLAN Ethernet Packet Type for Stacked VLAN Dynamic Profiles on page 376

Configuring the VLAN Ethernet Packet Type for Single-Tag VLAN Dynamic Profiles

To configure the VLAN Ethernet packet type the VLAN dynamic profile can accept:

1. Access the interface over which you want to create dynamic VLANs.

```
user@host# edit interfaces ge-0/0/0
```

2. Edit the VLAN **auto-configure** stanza.

```
[edit interfaces ge-0/0/0]
user@host# edit auto-configure
```

3. Edit the **vlan-ranges** stanza.

```
[edit interfaces ge-0/0/0 auto-configure]
user@host# edit vlan-ranges
```

4. Access the VLAN dynamic profile for which you want to configure VLAN ranges.

```
[edit interfaces ge-0/0/0 auto-configure vlan-ranges]
user@host# edit dynamic-profile VLAN-PROF1
```

5. Specify what VLAN Ethernet packet type the VLAN or stacked VLAN dynamic profile accepts.

NOTE: This release supports inet and dhcp-v4 Ethernet packet types for IPv4 packets and inet6 and dhcp-v6 Ethernet packet types for IPv6 packets.

```
[edit interfaces ge-0/0/0 auto-configure vlan-ranges]
user@host# set accept inet
```

Configuring the VLAN Ethernet Packet Type for Stacked VLAN Dynamic Profiles

To configure the VLAN Ethernet packet type the stacked VLAN dynamic profile can accept:

1. Access the interface over which you want to create dynamic VLANs.

   ```
   user@host# edit interfaces ge-0/0/0
   ```

2. Edit the VLAN **auto-configure** stanza.

   ```
   [edit interfaces ge-0/0/0]
   user@host# edit auto-configure
   ```

3. Edit the **stacked-vlan-ranges** stanza.

   ```
   [edit interfaces ge-0/0/0 auto-configure]
   user@host# edit stacked-vlan-ranges
   ```

4. Access the VLAN dynamic profile for which you want to configure VLAN ranges.

   ```
   [edit interfaces ge-0/0/0 auto-configure stacked-vlan-ranges]
   user@host# edit dynamic-profile STACKED-VLAN-PROF1
   ```

5. Specify what VLAN Ethernet packet type the stacked VLAN dynamic profile accepts.

   NOTE: This release supports inet and dhcp-v4 Ethernet packet types for IPv4 packets and inet6 and dhcp-v6 Ethernet packet types for IPv6 packets.

   ```
   [edit interfaces ge-0/0/0 auto-configure stacked-vlan-ranges]
   user@host# set accept inet
   ```

Configuring an Authentication Password for VLAN or Stacked VLAN Ranges

You can specify an authentication password for dynamically created VLAN or stacked VLAN interfaces at the **[edit interfaces *interface-name* auto-configure vlan-ranges authentication]** or **[edit interfaces *interface-name* auto-configure stacked-vlan-ranges authentication]** hierarchy level. This password is sent to the external AAA authentication server for subscriber authentication.

NOTE: You must configure the username-include statement to enable the use of authentication. The password statement is not required and does not cause the interface to use authentication if the username-include statement is not included.

To configure an authentication password:

1. Access the interface over which you want to create dynamic VLANs.

   ```
   user@host# edit interfaces ge-0/0/0
   ```

2. Edit the VLAN **auto-configure** stanza.

   ```
   [edit interfaces ge-0/0/0]
   user@host# edit auto-configure
   ```

3. Edit the **vlan-ranges** or **stacked-vlan-ranges** stanza.

   ```
   [edit interfaces ge-0/0/0 auto-configure]
   user@host# edit vlan-ranges
   ```

   or

   ```
   [edit interfaces ge-0/0/0 auto-configure]
   user@host# edit stacked-vlan-ranges
   ```

4. Edit the VLAN **authentication** stanza.

   ```
   [edit interfaces ge-0/0/0 auto-configure vlan-ranges]
   user@host# edit authentication
   ```

5. Specify a password that is sent to the external AAA authentication server for subscriber authentication.

   ```
   [edit interfaces ge-0/0/0 auto-configure vlan-ranges]
   user@host# set password PSSWD1
   ```

Related Documentation

- Configuring Dynamic Authentication for VLAN Interfaces on page 380

Configuring VLAN Ranges for Use with Dynamic Profiles

You define dynamic VLAN ranges under the **[edit interfaces]** hierarchy. You can configure VLAN ranges in the following ways for use with dynamic profiles:

- Configuring Single-Level VLAN Ranges for Use with VLAN Dynamic Profiles on page 377
- Configuring Stacked VLAN Ranges for Use with Stacked VLAN Dynamic Profiles on page 378
- Configuring Dynamic Mixed VLAN Ranges on page 379

Configuring Single-Level VLAN Ranges for Use with VLAN Dynamic Profiles

You configure VLAN ranges at the **[edit interfaces]** hierarchy level by specifying the **vlan-tagging** statement for the interface and defining VLAN ranges for use with a VLAN dynamic profile.

To configure a VLAN range:

1. Access the interface over which you want to create dynamic VLANs.

   ```
   user@host# edit interfaces ge-0/0/0
   ```

2. Specify the **vlan-tagging** statement to indicate that this interface is for use with stacked VLAN ranges.

   ```
   [edit interfaces ge-0/0/0]
   user@host# set vlan-tagging
   ```

3. Access the VLAN **[auto-configure]** hierarchy level.

```
[edit interfaces ge-0/0/0]
user@host# edit auto-configure
```

4. Access the **[vlan-ranges]** hierarchy level.

```
[edit interfaces ge-0/0/0 auto-configure]
user@host# edit vlan-ranges
```

5. Access the VLAN dynamic profile for which you want to configure VLAN ranges.

```
[edit interfaces ge-0/0/0 auto-configure vlan-ranges]
user@host# edit dynamic-profile VLAN-PROF1
```

6. Specify the VLAN ranges that you want the dynamic profile to use. The following example specifies a lower VLAN ID limit of 3000 and any upper VLAN ID limit (a range from 1 through 4094).

```
[edit interfaces ge-0/0/0 auto-configure vlan-ranges]
user@host# set ranges 3000-any
```

Configuring Stacked VLAN Ranges for Use with Stacked VLAN Dynamic Profiles

You configure stacked VLAN ranges at the **[edit interfaces]** hierarchy level by specifying the **stacked-vlan-tagging** statement for the interface and defining stacked VLAN ranges for use with a stacked VLAN dynamic profile.

To configure a VLAN range:

1. Access the interface over which you want to create dynamic VLANs.

```
user@host# edit interfaces ge-0/0/0
```

2. Specify the **stacked-vlan-tagging** statement to indicate that this interface is for use with stacked VLAN ranges.

```
[edit interfaces ge-0/0/0]
user@host# set stacked-vlan-tagging
```

3. Access the VLAN **[auto-configure]** hierarchy level.

```
[edit interfaces ge-0/0/0]
user@host# edit auto-configure
```

4. Access the **[stacked-vlan-ranges]** hierarchy level.

```
[edit interfaces ge-0/0/0 auto-configure]
user@host# edit stacked-vlan-ranges
```

5. Access the VLAN dynamic profile for which you want to configure VLAN ranges.

```
[edit interfaces ge-0/0/0 auto-configure vlan-ranges]
user@host# edit dynamic-profile VLAN-PROF1
```

6. Specify the outer and inner stacked VLAN ranges that you want the dynamic profile to use. The following example specifies an outer stacked VLAN ID range from 2000 through 4000 and an inner stacked VLAN ID range of **any** (enabling a range from 1 through 4094 for the inner stacked VLAN ID).

```
[edit interfaces ge-0/0/0 auto-configure vlan-ranges]
user@host# set ranges 2000-4000,any
```

Configuring Dynamic Mixed VLAN Ranges

Dynamic VLAN and dynamic stacked VLAN configuration supports mixed (or flexible) VLAN ranges. You configure mixed VLAN ranges at the **[edit interfaces]** hierarchy level by specifying the **flexible-vlan-tagging** statement for the interface and defining both VLAN and stacked VLAN ranges for use with different VLAN or stacked VLAN dynamic profiles.

NOTE: Junos VLAN IDs for single-tag VLANs are equivalent to the outer tags used for stacked (dual-tag) VLANs. When configuring mixed (flexible) VLANs, ensure that single-tag VLAN IDs and stacked VLAN outer tag values do not overlap.

To configure both VLAN and stacked VLAN ranges:

1. Access the interface over which you want to create dynamic VLANs.

   user@host# edit interfaces ge-0/0/0

2. Specify the **flexible-vlan-tagging** statement to indicate that this interface is for use with both VLAN and stacked VLAN ranges.

   [edit interfaces ge-0/0/0]
   user@host# set flexible-vlan-tagging

3. Define interface automatic configuration values.

   [edit interfaces ge-0/0/0]
   user@host# edit auto-configure

4. Specify that you want to modify VLAN ranges.

   [edit interfaces ge-0/0/0 auto-configure]
   user@host# edit vlan-ranges

5. Access the VLAN dynamic profile for which you want to configure VLAN ranges.

   [edit interfaces ge-0/0/0 auto-configure vlan-ranges]
   user@host# edit dynamic-profile VLAN-PROF1

6. Specify the VLAN ranges that you want the dynamic profile to use. The following example specifies a lower VLAN ID limit of 2000 and an upper VLAN ID limit of 3000.

   [edit interfaces ge-0/0/0 auto-configure vlan-ranges]
   user@host# set ranges 2000-3000

7. Specify that you want to modify stacked VLAN ranges.

   [edit interfaces ge-0/0/0 auto-configure]
   user@host# edit stacked-vlan-ranges

8. Access the VLAN dynamic profile for which you want to configure VLAN ranges.

   [edit interfaces ge-0/0/0 auto-configure vlan-ranges]
   user@host# edit dynamic-profile VLAN-PROF1

9. Specify the outer and inner stacked VLAN ranges that you want the dynamic profile to use. The following example specifies an outer stacked VLAN ID range from 3001

through 4000 (to avoid overlapping VLAN IDs with single-tag VLANs) and an inner stacked VLAN ID range of **any** (enabling a range from 1 through 4094 for the inner stacked VLAN ID).

```
[edit interfaces ge-0/0/0 auto-configure vlan-ranges]
user@host# set ranges 3001-4000,any
```

Configuring Dynamic Authentication for VLAN Interfaces

You can use dynamic profiles, in conjunction with RADIUS, to dynamically create logical VLAN interfaces in the default logical system and in a specified routing instance. As DHCP clients in the same VLAN become active, corresponding interfaces are assigned to any specified routing instances. You can also dynamically create an underlying VLAN interface for incoming subscribers, associate interfaces created on this VLAN with the default logical system and a specified routing instance, and define RADIUS authentication values for the dynamically created interfaces.

Before you configure dynamic VLAN authentication, configure DHCP Local Server or DHCP Relay over which you want the dynamic VLAN interfaces to function.

For information about DHCP Local Server or DHCP Relay, see:

- Extended DHCP Local Server Overview on page 84
- Extended DHCP Relay Agent Overview on page 136

NOTE: You can also configure dynamically created VLAN interfaces over PPP or PPPoE interfaces. For information about how to configure PPP or PPPoE, see the *Junos OS Network Interfaces Configuration Guide*.

To configure dynamic authentication for dynamically created VLAN interfaces:

1. Configure an access profile that contains the appropriate accounting order, authentication order, and server access values.

   For information about how to configure an access profile, RADIUS accounting, RADIUS statistics, and how to define RADIUS server access, see:

   - Configuring an Access Profile for Subscriber Management on page 53
   - Specifying the Authentication and Accounting Methods for Subscriber Access on page 20
   - Configuring Per-Subscriber Session Accounting on page 24
   - Configuring Router or Switch Interaction with RADIUS Servers on page 19

2. Configure a dynamic profile that uses the default logical system and creates specific routing instances to contain dynamically created VLAN interfaces.

   See “Configuring a VLAN Dynamic Profile That Associates VLAN Interfaces with Separate Routing Instances” on page 372.

3. Define the VLAN physical interface for automatic configuration.

   See the following topics:

   - Enabling VLAN Tagging
   - Configuring Which VLAN Ethernet Packet Types Dynamic Profiles Can Accept on page 375
   - Configuring VLAN Ranges for Use with Dynamic Profiles on page 377
   - Configuring an Authentication Password for VLAN or Stacked VLAN Ranges on page 376
   - Configuring VLAN Interface Username Information for AAA Authentication on page 381

4. Associate an access profile to the VLAN interface.

   See “Attaching Access Profiles” on page 53.

5. Associate a dynamic profile to the VLAN interface.

   See “Configuring VLAN Interfaces to Use Dynamic Profiles” on page 374.

Related Documentation

- Dynamic 802.1Q VLAN Overview on page 365

Configuring VLAN Interface Username Information for AAA Authentication

You can define interface information that is included in the username that is subsequently passed to the external AAA authentication service (for example, RADIUS) when creating dynamic VLANs or stacked VLANs. The AAA authentication service uses this information to authenticate the VLAN or stacked VLAN physical interface. Once authenticated, the AAA service can send the required routing instance values to the system for use in dynamically creating VLAN or stacked VLAN interfaces.

The **username-include** statement supports the following statement options:

- **circuit-type**—The circuit type used by the client, for example **enet**.
- **delimiter**—The delimiter character that separates components that make up the concatenated username. The default delimiter is a period (.). The semicolon (;) is not supported as a delimiter character.
- **domain-name**—The client domain name as a string. The router adds the @ delimiter to the username.
- **interface-name**—The interface name as a string. The router appends the interface name and VLAN ID or stacked VLAN ID to the username string used for authentication. The appended information takes the following format:
  - For single VLAN—**<interface-name>:<4-digit-vlan-id>**
  - For stack VLANs—**<interface-name>:<4-digit-svlan-id>-<4-digit-vlan-id>**

- **mac-address**—The client hardware address (chaddr), obtained from the DHCP discover packet, in a string of the format ***xxxx.xxxx.xxxx***. (Used for DHCPv4 packet authentication only.)
- **option-82**—The raw payload of the option 82 from the PDU is concatenated to the username. (Used for DHCPv4 packet authentication only.)
- **radius-realm**—A string indicating the RADIUS realm.
- **user-prefix**—A string indicating the user prefix.

The username takes the format
<user-prefix><mac-address><circuit-type><option–82><interface-name><domain-name><radius-realm>
with each component separated by whatever delimiter you choose.

NOTE: The following example configures username information on VLANs. However, you can also configure dynamic authentication on stacked VLANs by configuring the same statements at the [edit interfaces *interface-name* auto-configure stacked-vlan-ranges authentication] hierarchy level.

To configure VLAN interface username information:

1. Access the interface over which you want to configure username information.

   user@host# edit interfaces ge-0/0/0

2. Edit the **auto-configure** stanza.

   [edit interfaces ge-0/0/0]
   user@host# edit auto-configure

3. Edit the **vlan-ranges** stanza.

   [edit interfaces ge-0/0/0 auto-configure]
   user@host# edit vlan-ranges

4. Edit the **authentication** stanza.

   [edit interfaces ge-0/0/0 auto-configure vlan-ranges]
   user@host# edit authentication

5. Edit the **username-include** stanza.

6. Specify the username statements that you want the AAA authentication service to use to authenticate the username.

   [edit interfaces ge-0/0/0 auto-configure vlan-ranges authentication username-include]
   user@host# set delimiter

Related Documentation

- Configuring Dynamic Authentication for VLAN Interfaces on page 380

Verifying and Managing Dynamic VLAN Configuration

Purpose View or clear information about dynamic VLANs and stacked VLANs.

Action

- To display subscriber dynamic VLAN information:

  user@host>**show subscribers detail**

- To display interface-specific output for dynamic VLANs:

  user@host> **show interfaces *interface-name***

- To clear the binding state of dynamic VLAN interfaces:

  user@host> **clear auto-configuration interfaces**

Related Documentation

- For more information, see the *Junos OS System Basics and Services Command Reference* and the *Junos OS Interfaces Command Reference*.

CHAPTER 35

Dynamic VLAN Examples

Example: Configuring a VLAN Dynamic Profile for VLANs with a TPID of 0x8100

```
vlan-prof1 {
  interfaces {
    "$junos-interface-ifd-name" {
      unit "$junos-interface-unit" {
        vlan-id "$junos-vlan-id"; #Note the statement and variable use.
        family inet {
          unnumbered-address lo0.0 preferred-source-address 10.20.0.2;
        }
      }
    }
  }
}
```

Example: Configuring a VLAN Dynamic Profile for VLANs with Any TPID Value and Enabling Demux Interfaces over the VLAN Interface

```
vlan-prof-any-tpid {
  interfaces {
    $junos-interface-ifd-name {
      unit $junos-interface-unit {
        demux-source inet; #Enables demux interface use over the VLAN interface.
        vlan-tags outer $junos-vlan-id; #Statement/variable combination enables the
          recognition of any VLAN interface TPID value.
        family inet {
```

```
            unnumbered-address lo0.0 preferred-source-address 10.20.0.2;
          }
        }
      }
    }
}
```

Example: Configuring a Stacked VLAN Dynamic Profile

```
svlan-prof1 {
  interfaces {
    $junos-interface-ifd-name {
      unit $junos-interface-unit {
        vlan-tags outer $junos-stacked-vlan-id inner $junos-vlan-id;
        family inet {
          unnumbered-address lo0.0 preferred-source-address 100.20.0.2;
        }
      }
    }
  }
}
```

Example: Dynamic VLAN Interface Configuration

```
interfaces {
  ge-0/0/0 {
    vlan-tagging;
    auto-configure {
      vlan-ranges {
        dynamic-profile vlan-prof1 {
          accept inet;
          ranges {
            any;
          }
        }
      }
    }
  }
}
```

Example: Dynamic Stacked VLAN Interface Configuration

```
interfaces {
  ge-0/0/0 {
    stacked-vlan-tagging;
    auto-configure {
      stacked-vlan-ranges {
        dynamic-profile svlan-prof {
          accept inet;
          ranges {
            1-1, any;
          }
        }
      }
    }
```

```
    }
}
```

Example: Dynamic Flexible VLAN Interface Configuration

```
interfaces {
    ge-0/0/0 {
        flexible-vlan-tagging;
        auto-configure {
            vlan-ranges {
                dynamic-profile vlan-prof1 {
                    accept inet;
                    ranges {
                        any;
                    }
                }
            }
            stacked-vlan-ranges {
                dynamic-profile svlan-prof1 {
                    accept inet;
                    ranges {
                        1-1, any;
                    }
                }
            }
        }
    }
}
```

Example: Configuring a Flexible VLAN Interface for Use with a Nonstandard Ethertype

This example specifies an ethertype of 0x9100 instead of the standard 0x8100.

```
interfaces {
    ge-0/0/0 {
        flexible-vlan-tagging;
        gigether-options {
            ethernet-switch-profile {
                tag-protocol-id 0x9100;
            }
        }
        auto-configure {
            vlan-ranges {
                dynamic-profile vlan-prof {
                    accept inet;
                    ranges {
                        any;
                    }
                }
            }
            stacked-vlan-ranges {
                dynamic-profile svlan-prof {
                    accept inet;
                    ranges {
                        1-1,any;
```

```
            }
          }
        }
      }
    }
  }
```

PART 11

Subscriber Interfaces

CHAPTER 36

Subscriber Interface Overview

Subscriber Interface Overview

In this release, you can identify subscribers statically or dynamically.

To identify subscribers statically, you can reference a static VLAN interface in a dynamic profile. To identify subscribers dynamically, you create variables for demux interfaces that are dynamically created by DHCP when subscribers log in.

Statically Identifying Subscribers

Before you can configure static subscriber interfaces in a dynamic profile, you must first configure the logical interfaces on the router to which you expect clients to connect. After you have created the static interfaces, you can modify them by using dynamic profiles to apply configuration parameters.

You can also configure subscribers by creating sets of static IP demux interfaces that are not referenced in a dynamic profile.

When configuring the interfaces stanza within a dynamic profile, you use variables to specify the interface name and the logical unit value. When a DHCP subscriber sends a DHCP request to the interface, the dynamic profile replaces the **interface-name** and **unit** variables with the actual interface name and logical unit number of the interface that received the DHCP request. After this association is made, the router configures the interface with any CoS or protocol (that is, IGMP) configuration within the dynamic profile, or applies any input or output filter configuration that you have associated with that dynamic profile.

```
[edit dynamic-profiles]
interfaces interface-name {
   unit logical-unit-number {
      family family {
         address address;
         filter {
```

```
            input filter-name;
            output filter-name;
        }
        unnumbered-address interface-name preferred-source-address address;
        vlan-id;
    }
    vlan-tagging;
}
```

Dynamically Identifying Subscribers

You can configure demux interfaces to represent a subscriber interface in a dynamic profile. When a subscriber logs in using a DHCP access method, the demux interface is dynamically created.

You specify variables for the unit number, the name of the underlying interface, and the IP address in the dynamic profile. These variables are replaced with the values that are supplied by DHCP when the subscriber logs in.

Related Documentation

- Static Subscriber Interfaces and VLAN Overview on page 392
- Subscriber Interfaces and Demultiplexing Overview on page 393

Static Subscriber Interfaces and VLAN Overview

This topic describes the topology for configuring subscriber interfaces over static VLAN interfaces in the current release.

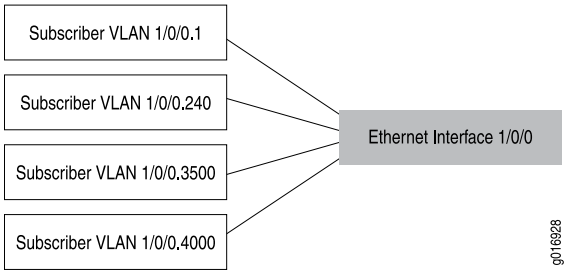
In a dynamic profile, you can configure VLAN subscriber interfaces over the following statically created logical interface types:

- GE—Gigabit Ethernet
- XE—10–Gigabit Ethernet
- AE—Aggregated Ethernet

We recommend that you configure each subscriber on a statically created VLAN.

Figure 9 on page 392 shows an example of subscriber interfaces on an individual VLAN.

Figure 9: VLAN Subscriber Interfaces



You can further separate VLANs on subscriber interfaces by configuring a VLAN interface as the underlying interface for a set of IP demux interfaces.

Related Documentation

- Configuring a Subscriber Interface with a Static VLAN Interface on page 398
- For more information about demux interfaces, see Subscriber Interfaces and Demultiplexing Overview on page 393

Subscriber Interfaces and Demultiplexing Overview

You can create logical subscriber interfaces using static or dynamic demultiplexing interfaces. In addition, you can use either IP demultiplexing interfaces or VLAN demultiplexing interfaces when creating logical subscriber interfaces.

Demultiplexing (demux) interfaces are logical interfaces that share a common, underlying logical interface (in the case of IP demux) or underlying physical interface (in the case of VLAN demux). You can use these interfaces to identify specific subscribers or to separate individual circuits by IP address (IP demux) or VLAN ID (VLAN demux).

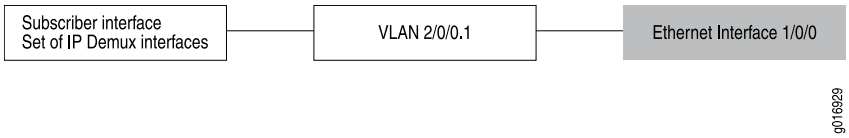
The subscriber interfaces can provide different levels of services for individual subscribers in an access network. For example, you can apply CoS parameters for each subscriber.

Interface Sets of Static Demux Interfaces

You can group static demux interfaces to create individual subscriber interfaces using interface sets. Interface sets enable you to provide the same level of service for a group of subscribers; for example, all residential subscribers who receive the basic data service.

Figure 10 on page 393 shows a subscriber interface configured using a set of IP demux interfaces with an underlying VLAN interface.

Figure 10: IP Demux Subscriber Interface



Dynamic Demultiplexing Interfaces

You can configure demux interfaces to represent a dynamic subscriber interface in a dynamic profile.

Demux interfaces are dynamically created by a DHCP access method when the underlying interface for the demux interface is configured for the access method. The DHCP access model creates the demux interface with the subscriber's assigned IP address (for IP demux interfaces) or VLAN ID (for VLAN demux interfaces).

To configure an IP demux interface in the dynamic profile, you specify variables for the unit number, the name of the underlying interface, and the IP address. To configure a VLAN demux interface in the dynamic profile, you specify variables for the unit number, the name of the underlying interface, and the VLAN ID. These variables are replaced with the values that are supplied by DHCP when the subscriber logs in.

Guidelines for Configuring Demux Interfaces for Subscriber Access

When you configure static or dynamic demux interfaces for subscriber access, consider the following guidelines:

- You can only configure interface sets of static demux interfaces and dynamic demux interfaces on MX Series Ethernet Services Routers. Hierarchical and per-unit scheduling is supported for dynamically created demux interfaces on the EQ DPC.
- You can configure IPv4 and IPv6 addressing for static and dynamic demux interfaces.
- You can configure only one **demux0** interface per chassis.
- For IP demux interfaces, you can define logical demux interfaces on top of the **demux0** interface (for example, **demux0.1**, **demux0.2**, and so on).
- Demux interfaces currently support only Gigabit Ethernet, Fast Ethernet, 10-Gigabit Ethernet, and aggregated Ethernet underlying interfaces.
- You must associate IP demux interfaces with an underlying logical interface.
- You must associate VLAN demux interfaces with an underlying device (physical interface).
- You cannot use a dynamic demux interface to represent multiple subscribers in a dynamic profile attached to an interface. One dynamic demux interface represents one subscriber. Do not configure the **aggregate-clients** option when attaching a dynamic profile to a demux interface for DHCP.

Related Documentation

- Configuring Static Subscriber Interfaces Using IP Demux Interfaces on page 398
- Configuring Static Subscriber Interfaces Using VLAN Demux Interfaces on page 399
- Configuring a Subscriber Interface Using a Set of Static IP Demux Interfaces on page 400
- Configuring a Subscriber Interface Using a Set of Static VLAN Demux Interfaces on page 402
- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 403
- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 404
- CoS and Static IP Demux Interface Set Overview on page 635
- For more information about static demux interfaces and other configuration guidelines, see the *Junos OS Network Interfaces Configuration Guide*

MAC Address Validation for Subscriber Interfaces Overview

MAC address validation enables the router to validate that received packets contain a trusted IP source and an Ethernet MAC source address.

Configuring MAC address validation can provide additional validation when subscribers access billable services. MAC address validation provides additional security by enabling the router to drop packets that do not match, such as packets with spoofed addresses.

When subscribers log in, they are automatically assigned IP addresses by DHCP. The router detects the valid IP source and MAC source addresses for incoming packets and forwards the packets regardless of which subscriber originated the packet.

Supported Types of Subscriber Interfaces

MAC address validation is supported on statically created Ethernet interfaces and dynamically created demux interfaces on MX Series Ethernet Services Routers.

Trusted Addresses

A trusted address tuple is a 32–bit IP address and a 48–bit MAC address. Prefixes and ranges are not supported.

The IP source address and the MAC source address used for validation must be from a trusted source.

All static ARP addresses configured through the CLI are trusted addresses; dynamic ARP addresses are not considered trusted addresses.

Addresses dynamically created through a DHCP local server or DHCP relay are also trusted addresses. When a DHCP server and client negotiate an IP address, the resulting IP address and MAC address tuple is trusted. Each DHCP subscriber can generate more than one address tuple.

Each MAC address can have more than one IP address, which can result in more than one valid tuple. Each IP address must map to one MAC address.

Types of MAC Address Validation

You can configure two types of MAC address validation:

- Loose—Forwards packets when both the IP source address and the MAC source address match one of the trusted address tuples.

  Drops packets when the IP source address matches one of the trusted tuples, but the MAC address does not support the MAC address of the tuple. The system processes this packet as spoofed.

  Continues to forward packets when the source address of the incoming packet does not match any of the trusted IP addresses.

- Strict—Forwards packets when both the IP source address and the MAC source address match one of the trusted address tuples.

Drops packets when the MAC address does not match the tuple's MAC source address, or when IP source address of the incoming packet does not match any of the trusted IP addresses.

When you configure MAC address validation for demux interfaces in a dynamic profile and specify either **loose** or **strict** validation, the resulting behavior is always loose validation. To enable strict behavior for a dynamic demux interface, you must configure strict validation for the underlying interface.

Related Documentation

- Configuring MAC Address Validation for Subscriber Interfaces on page 405

CHAPTER 37

Configuring Subscriber Interfaces for Dynamic Profiles

Configuring Static Subscriber Interfaces in Dynamic Profiles

In this release, you can use dynamic profiles to configure statically created logical interfaces. Dynamic profiles enable you to dynamically apply configured values (including CoS, IGMP, or filter configuration) to the static interfaces, making them easier to manage.

To configure static interfaces, you must first configure the interfaces on the router to which you expect subscribers to connect.

The subscriber access feature supports the following statically-created interface types in dynamic profiles:

- GE—Gigabit Ethernet
- XE—10 Gigabit Ethernet
- AE—Aggregated Ethernet

This topic contains the following sections:

Configuring a Subscriber Interface with a Static VLAN Interface

This topic describes how to configure a subscriber interface with a static VLAN interface.

After you configure the static VLAN interface, you can reference it in a dynamic profile.

To configure a subscriber interface over a VLAN:

1. Configure the static VLAN interface and enable VLAN tagging.

```
[edit interfaces]
  ge-5/0/0 {
    vlan-tagging;
  }
```

2. Configure the units and assign the VLAN IDs.

```
unit 1 {
  proxy-arp;
  vlan-id 1;
  family inet {
    unnumbered-address lo0.0 preferred-source-address 192.1.1.1;
  }
}
unit 2 {
  proxy-arp;
  vlan-id 2;
  family inet {
    unnumbered-address lo0.0 preferred-source-address 192.1.1.1;
  }
}
```

3. Associate the static subscriber interface in a dynamic profile.

   See “Associating Dynamic Profiles with Statically Created Interfaces” on page 399.

Configuring Static Subscriber Interfaces Using IP Demux Interfaces

You can configure a subscriber interface using a statically created IP demux interface. This interface can be referenced in a dynamic profile.

To configure a static IP demux subscriber interface:

1. Configure the IP demux interface on a physical device represented by a logical unit number. The logical interface resides on a physical device.

   See Configuring an IP Demultiplexing Interface.

2. Configure the underlying interface on which the IP demux interface is running.

   See Configuring an IP Demux Underlying Interface

3. Specify the underlying interface on which the IP demux interface is running.

   See Specifying the Demux Underlying Interface.

4. Specify how ingress IPv4 traffic is to be demultiplexed based on packet destination or source addresses.

See Configuring IP Demux Prefixes.

5. Associate the static subscriber interface in a dynamic profile.

   See “Associating Dynamic Profiles with Statically Created Interfaces” on page 399.

NOTE: VLAN demux interfaces currently support the Internet Protocol version 4 (IPv4) suite (family inet) and the Internet Protocol version 6 (IPv6) suite (family inet6).

Configuring Static Subscriber Interfaces Using VLAN Demux Interfaces

You can configure a subscriber interface using a statically created VLAN demux interface. This interface can be referenced in a dynamic profile.

To configure a static VLAN demux subscriber interface:

1. Configure the VLAN demux interface.

   See Configuring a VLAN Demultiplexing Interface.

2. Configure the underlying interface on which the VLAN demux interface is running.

   See Configuring a VLAN Demux Underlying Interface

3. Specify the underlying interface on which the VLAN demux interface is running.

   See Specifying the Demux Underlying Interface.

4. Specify how ingress IP traffic is to be demultiplexed based on the VLAN ID.

   See Associating VLAN IDs to VLAN Demux Interfaces.

5. Associate the static subscriber interface in a dynamic profile.

   See “Associating Dynamic Profiles with Statically Created Interfaces” on page 399.

NOTE: VLAN demux interfaces currently support the Internet Protocol version 4 (IPv4) suite (family inet) and the Internet Protocol version 6 (IPv6) suite (family inet6).

Associating Dynamic Profiles with Statically Created Interfaces

When configuring the interfaces stanza within a dynamic profile, you use variables to specify the interface name and the logical unit value. When a DHCP subscriber sends a DHCP request to the interface, the dynamic profile replaces the interface name variable and logical unit name variable with the actual interface name and logical unit number of the interface that received the DHCP request.

NOTE: Configuration of the interface name variable and logical interface name variable at the [edit dynamic-profiles *profile-name* interfaces] hierarchy level is required for a dynamic profile to function.

To configure the interface for a dynamic profile, specify the interface name variable and include the **unit** statement and associated logical interface name variable:

1. Access the profile.

   ```
   [edit]
   user@host# edit dynamic-profiles basic-profile
   ```

2. Specify the interface name variable.

   ```
   [edit dynamic-profiles basic-profile]
   user@host# set interfaces $junos-interface-ifd-name
   ```

3. Specify the logical interface name variable with the **unit** statement.

   When referencing an existing interface, specify the **$junos-underlying-interface-unit** variable used by the router to match the unit value of the receiving interface:

   ```
   [edit dynamic-profiles basic-profile]
   user@host# set unit $junos-underlying-interface-unit
   ```

   When creating dynamic interfaces, specify the **$junos-interface-unit** variable used by the router to generate a unit value for the interface:

   ```
   [edit dynamic-profiles basic-profile]
   user@host# set unit $junos-interface-unit
   ```

Related Documentation

- Static Subscriber Interfaces and VLAN Overview on page 392
- For information about configuring logical interfaces and static VLAN interfaces, see the *Junos OS Network Interfaces Configuration Guide*

Configuring a Subscriber Interface Using a Set of Static IP Demux Interfaces

You can create logical subscriber interfaces from IP demux interfaces. IP demultiplexing (demux) interfaces are logical interfaces that share a common, underlying logical interface. IP demux interfaces can be used to identify specific subscribers or to separate individual circuits.

You can group individual subscriber interfaces using interface sets to provide the same level of service for a group of subscribers; for example, all residential subscribers who receive the basic data service. Interface sets can be defined as a list of logical interfaces (unit 0, unit 1, and so on).

To configure a group of static IP demux interfaces:

1. Configure the interface set.

   ```
   interfaces {
     interface-set demux-set {
   ```

```
    interface demux0 {
      unit 0;
      unit 1;
      }
    }
  }
```

2. Define the units of the interface set.

```
demux0 {
  unit 0 {
    demux-options {
      underlying-interface ge-2/0/1.1;
    }
    family inet {
      demux-source {
        1.1.1.0/24;
      }
      address 1.1.1.1/24;
    }
  }
  unit 1 {
    demux-options {
      underlying-interface ge-2/0/1.1;
    }
    family inet {
      demux-source {
        1.1.2.0/24;
      }
      address 1.1.2.1/24;
    }
  }
}
```

Related Documentation

- Configuring CoS on a Set of Static IP Demux Interfaces on page 641
- Subscriber Interfaces and Demultiplexing Overview on page 393
- For information about the **[edit interfaces]** hierarchy and the **interface-set** statement, see the *Junos OS Network Interfaces Configuration Guide*

Configuring a Subscriber Interface Using a Set of Static VLAN Demux Interfaces

You can create logical subscriber interfaces from VLAN demux interfaces. VLAN demultiplexing (demux) interfaces are logical interfaces that share a common, underlying physical interface. VLAN demux interfaces can be used to identify specific subscribers or to separate individual circuits.

You can group individual subscriber interfaces using interface sets to provide the same level of service for a group of subscribers; for example, all residential subscribers who receive the basic data service. Interface sets can be defined as a list of logical interfaces (unit 0, unit 1, and so on).

To configure a group of static VLAN demux interfaces:

1. Configure the interface set.

```
interfaces {
  interface-set demux-set {
    interface demux0 {
      unit 0;
      unit 1;
      }
    }
  }
```

2. Define the units of the interface set.

```
demux0 {
  unit 0 {
    vlan-id 10;
    demux-options {
      underlying-interface ge-2/0/1;
    }
    family inet {
      address 1.1.1.1/24;
    }
  }
  unit 1 {
    vlan-id 20;
    demux-options {
      underlying-interface ge-2/0/1;
    }
    family inet {
      address 1.1.2.1/24;
    }
  }
}
```

Related Documentation

- Configuring CoS on a Set of Static IP Demux Interfaces on page 641
- Subscriber Interfaces and Demultiplexing Overview on page 393
- For information about the **[edit interfaces]** hierarchy and the **interface-set** statement, see the *Junos OS Network Interfaces Configuration Guide*

Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles

You can configure dynamic subscriber interfaces using IP demux interfaces.

To enable the dynamic demux interface to be created by DHCP, you configure the demux options in a dynamic profile. Dynamic profiles enable you to dynamically apply configured values (including CoS, IGMP, or filter configuration) to the dynamic interfaces, making them easier to manage.

Before you begin:

- Configure the dynamic profile.

  See “Configuring a Basic Dynamic Profile” on page 349.

To configure dynamic subscriber interfaces:

1. Specify that you want to configure the **demux0** interface in the dynamic profile.

   ```
   user@host#  edit dynamic-profiles business-profile interfaces demux0
   ```

2. Configure the unit for the **demux0** interface.

   a. Configure the variable for the unit number of the **demux0** interface.

      The variable is dynamically replaced with the unit number that DHCP supplies when the subscriber logs in.

      ```
      [edit dynamic-profiles business-profile interfaces demux0]
      user@host# edit unit $junos-interface-unit
      ```

   b. Configure the variable for the underlying interface of the demux interfaces and specify the **$junos-underlying-interface** variable.

      The variable is dynamically replaced with the underlying interface that DHCP supplies when the subscriber logs in.

      ```
      [edit dynamic-profiles business-profile interfaces demux0 unit
        “$junos-interface-unit”]
      user@host# set demux-options underlying-interface $junos-underlying-interface
      ```

3. Configure the family for the demux interfaces.

   a. Specify that you want to configure the family.

      For IPv4:

      ```
      [edit dynamic-profiles business-profile interfaces demux0 unit
        “$junos-interface-unit”]
      user@host# edit family inet
      ```

      For IPv6:

      ```
      [edit dynamic-profiles business-profile interfaces demux0 unit
        “$junos-interface-unit”]
      user@host# edit family inet6
      ```

b. Configure the unnumbered address for the family.

```
[edit dynamic-profiles business-profile interfaces demux0 unit
  "$junos-interface-unit" family inet]
user@host#  set unnumbered-address lo0.0
```

c. Configure the variable for the IP address of the demux interface.

The variable is dynamically replaced with the IP address that DHCP supplies when the subscriber logs in. For IPv4, use **$junos-subscriber-ip-address**; for IPv6, use **$junos-subscriber-ipv6-address**

```
[edit dynamic-profiles business-profile interfaces demu0 unit "$junos-interface-unit"]
user@host# set demux-source $junos-subscriber-ip-address
```

Related Documentation

- Subscriber Interfaces and Demultiplexing Overview on page 393
- Configuring MAC Address Validation for Dynamic Subscriber Interfaces on page 406
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109
- Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces on page 411
- Example: Configuring Dynamic Subscriber Interfaces on VLAN Demux Interfaces

Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles

You can configure dynamic subscriber interfaces using VLAN demux interfaces.

To enable the dynamic demux interface to be created by DHCP, you configure the demux options in a dynamic profile. Dynamic profiles enable you to dynamically apply configured values (including CoS, IGMP, or filter configuration) to the dynamic interfaces, making them easier to manage.

Before you begin:

- Configure the dynamic profile.

  See "Configuring a Basic Dynamic Profile" on page 349.

To configure dynamic subscriber interfaces:

1. Specify that you want to configure the **demux0** interface in the dynamic profile.

```
user@host#  edit dynamic-profiles business-profile interfaces demux0
```

2. Configure the unit for the **demux0** interface.

   a. Configure the variable for the unit number of the **demux0** interface.

   The variable is dynamically replaced with the unit number that DHCP supplies when the subscriber logs in.

```
[edit dynamic-profiles business-profile interfaces demux0]
user@host# edit unit $junos-interface-unit
```

b. Configure the variable for the underlying interface of the demux interfaces by specifying the **$junos-interface-ifd-name** variable.

The variable is dynamically replaced with the underlying device name that DHCP supplies when the subscriber logs in.

```
[edit dynamic-profiles business-profile interfaces demux0 unit
  "$junos-interface-unit"]
user@host# set demux-options underlying-interface $junos-interface-ifd-name
```

c. Configure the variable for the VLAN ID.

```
[edit dynamic-profiles business-profile interfaces demux0 unit
  "$junos-interface-unit"]
user@host# set vlan-id $junos-vlan-id
```

3. Configure the family for the demux interfaces.

a. Specify that you want to configure the family.

For IPv4:

```
[edit dynamic-profiles business-profile interfaces demux0 unit
  "$junos-interface-unit"]
user@host# edit family inet
```

For IPv6:

```
[edit dynamic-profiles business-profile interfaces demux0 unit
  "$junos-interface-unit"]
user@host# edit family inet6
```

b. Configure the unnumbered address for the family.

```
[edit dynamic-profiles business-profile interfaces demux0 unit
  "$junos-interface-unit" family inet]
user@host#  set unnumbered-address lo0.0
```

Related Documentation

- Subscriber Interfaces and Demultiplexing Overview on page 393
- Configuring MAC Address Validation for Dynamic Subscriber Interfaces on page 406
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109
- Example: Configuring Dynamic Subscriber Interfaces on VLAN Demux Interfaces

Configuring MAC Address Validation for Subscriber Interfaces

This topic describes how to configure MAC address validation for subscriber interfaces in dynamic profiles on MX Series routers.

The subscriber interfaces can be statically created and associated with a dynamic profile (for example, VLAN interfaces) or dynamically created in the dynamic profile (such as demux interfaces).

By default, MAC address validation is disabled.

This topic contains the following sections:

Configuring MAC Address Validation for Static Subscriber Interfaces

This topic describes how to configure MAC address validation for static subscriber interfaces in dynamic profiles on MX Series routers.

Before you begin:

- Configure the dynamic profile.

  See “Configuring a Basic Dynamic Profile” on page 349.

To configure MAC address validation on static subscriber interfaces:

1. Configure the static VLAN interface.

   ```
   [edit interfaces]
   user@host# set fe-0/0/0 unit 0 family inet
   ```

2. Configure the type of MAC address validation for the interface.

   - To configure loose validation:

     ```
     [edit interfaces fe-0/0/0 unit 0 family inet]
     user@host# set mac-validate loose
     ```

   - To configure strict validation:

     ```
     [edit interfaces fe-0/0/0 unit 0 family inet]
     user@host# set mac-validate strict
     ```

After you configure MAC address validation:

- Associate the static VLAN interface with the dynamic profile.

  See “Associating Dynamic Profiles with Statically Created Interfaces” on page 399.

Configuring MAC Address Validation for Dynamic Subscriber Interfaces

This topic describes how to configure MAC address validation for subscriber interfaces created on demux interfaces in dynamic profiles on MX Series routers.

When you configure MAC address validation for demux interfaces in a dynamic profile and specify either **loose** or **strict** validation, the resulting behavior is always loose validation. To enable strict behavior for a dynamic IP demux interface, you must configure strict validation for the underlying interface.

Before you begin:

- Configure the dynamic profile.

  See “Configuring a Basic Dynamic Profile” on page 349.

- Configure the dynamic IP demux interface.

  See “Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles” on page 403.

To configure MAC address validation for a dynamic subscriber interface:

1. Configure loose validation for the demux interface.

   ```
   [edit dynamic-profiles interfaces unit “$junos-interface-unit” family inet]
   user@host# set mac-validate loose
   ```

2. (Optional) Configure strict validation for the underlying interface.

   ```
   [edit interfaces fe-0/0/0 unit 0 family inet]
   user@host# set mac-validate strict
   ```

Related Documentation

- MAC Address Validation for Subscriber Interfaces Overview on page 395
- Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces on page 411

CHAPTER 38

Subscriber Interface Examples

Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface (Multiple Logical Units)

```
[edit interfaces]
ge-5/0/0 {
   vlan-tagging;
   unit 1 {
      proxy-arp;
      vlan-id 1;
      family inet {
         unnumbered-address lo0.0 preferred-source-address 192.1.1.1;
      }
   }
   unit 2 {
      proxy-arp;
      vlan-id 2;
```

```
    family inet {
      unnumbered-address lo0.0 preferred-source-address 192.1.1.1;
    }
  }
}
```

Related Documentation

- Configuring Static Subscriber Interfaces in Dynamic Profiles on page 397

Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface

```
[edit interfaces]
ge-5/2/0 {
  vlan-tagging;
  unit 1 {
    vlan-id 1;
    family inet {
      address 192.2.1.1/24;
    }
  }
}
```

Related Documentation

- Configuring Static Subscriber Interfaces in Dynamic Profiles on page 397

Example: Configuring a Static Subscriber Interface on a Gigabit Ethernet VLAN Interface (No Autonegotiation)

```
[edit interfaces]
ge-5/1/9 {
  vlan-tagging;
  gigether-options {
    no-auto-negotiation;
  }
  unit 2004 {
    vlan-id 2004;
    family inet {
      address 222.0.0.1/22;
    }
  }
}
```

Related Documentation

- Configuring Static Subscriber Interfaces in Dynamic Profiles on page 397

Example: Configuring a Static Subscriber Interface with a Loopback

```
lo0 {
  unit 0 {
    family inet {
      address 192.1.1.1/32;
    }
  }
}
```

Related Documentation

- Configuring Static Subscriber Interfaces in Dynamic Profiles on page 397

Example: Configuring Dynamic Subscriber Interfaces on IP Demux Interfaces

This example shows how to configure dynamic subscriber interfaces on IP demux interfaces. DHCP dynamically creates the demux interface when a subscriber logs in.

To configure subscribers on dynamic IP demux interfaces:

1. Configure the static VLAN as the underlying interface.

```
interfaces {
  ge-0/3/0 {
    vlan-tagging;
    unit 0 {
      vlan-id 0;
      demux-source inet;
      family inet {
        unnumbered-address lo0.0;
      }
    }
  }
  lo0 {
    unit 0 {
      family inet {
        address 90.1.1.1/24;
      }
    }
  }
}
```

2. Configure the creation of demux interfaces in the dynamic profile.

```
dynamic-profiles {
  subscriber-profile {
    interfaces {
      demux0 {
        "$junos-interface-ifd-name" {
          unit "$junos-interface-unit" {
            demux-options {
              underlying-interface "$junos-underlying-interface";
            }
            family inet {
              demux-source {
                $junos-subscriber-ip-address;
              }
              filter {
                input ingressFilter;
                output egressFilter;
              }
              mac-validate loose;
            }
          }
        }
      }
```

```
    }
  }
}
```

3. Configure the access method to dynamically create the demux interface.

   DHCP relay is the access method used in this example.

```
forwarding-options {
  dhcp-relay {
    traceoptions {
      flag all;
    }
    server-group {
      router {
        100.20.42.1;
      }
      dynamic-profile subscriber-profile;
      active-server-group erx;
      group one {
        interface ge-0/0/2.0 upto ge-0/0/2.4000;
        interface-client-limit 200
      }
    }
  }
```

4. Configure the interface for DHCP.

```
interfaces {
  traceoptions {
    flag all;
  }
  ge-0/0/2 {
    unit 0 {
      demux-source inet;
      family inet {
        unnumbered-address lo0.0;
      }
    }
  }
  lo0 {
    unit 0 {
      family inet {
        address 100.20.32.2/32;
      }
    }
  }
}
```

Related Documentation

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 403
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109

Example: Configuring IPv6 Addressing for a Dynamic IP Demux Interface over Static VLANs

In this example, the network administrator configures IPv6 addressing for a dynamic IP demux interface over a group of static VLANs.

```
[edit]
dynamic-profiles {
   dhcp-demux-profile {
      interfaces {
         demux0 {
            unit "$junos-interface-unit" {
               demux-options {
                  underlying-interface "$junos-underlying-interface";
               }
               family inet6 {
                  address 2001::1/64;
                  demux-source {
                     $junos-subscriber-ipv6-address;
                  }
               }
            }
         }
      }
   }
}
system {
   services {
      dhcp-local-server {
         dhcpv6 {
            dynamic-profile dhcp-demux-prof;
            group vlan {
               interface ge-1/0/0.100;
            }
         }
      }
   }
}
interfaces {
   ge-1/0/0 {
      vlan-tagging;
      unit 100 {
         demux-source inet6;
         vlan-id 100;
         family inet6 {
            address 2001::1/64;
         }
      }
   }
}
access {
   address-assignment {
      pool dhcp {
         family inet6 {
```

```
            prefix 2001:0000:0000:0000::/64;
            range limits prefix-length 74;
          }
        }
      }
    }
```

Related Documentation

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 403

Example: Configuring IPv6 Addressing for a Dynamic IP Demux Interface over Dynamic VLANs

In this example, the network administrator configures IPv6 addressing for a dynamic IP demux interface over a group of dynamic VLANs.

```
dynamic-profiles {
  vlan-profile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-interface-unit" {
          vlan-id "$junos-vlan-id";
          demux-source inet6;
          family inet6 {
            unnumbered-address lo0.0 preferred-source-address ::100.20.32.2;
          }
        }
      }
    }
  }
  svlan-profile {
    interfaces {
      $junos-interface-ifd-name {
        unit $junos-interface-unit {
          demux-source inet6;
          vlan-tags outer $junos-stacked-vlan-id inner $junos-vlan-id;
          family inet6 {
            unnumbered-address lo0.0 preferred-source-address ::100.20.32.2;
          }
        }
      }
    }
  }
  dhcp-demux-prof {
    interfaces {
      demux0 {
        unit "$junos-interface-unit" {
          demux-options {
            underlying-interface "$junos-underlying-interface";
          }
          family inet6 {
            demux-source {
              $junos-subscriber-ipv6-address;
            }
```

```
            unnumbered-address lo0.0 preferred-source-address 2001:db8:ffff:1::1;
          }
        }
      }
    }
  }
  all-profile {
    interfaces {
      $junos-interface-ifd-name {
        unit $junos-underlying-interface-unit {
        }
      }
    }
  }
  }
  }
  services {
    dhcp-local-server {
      traceoptions {
        file dhcp size 1g;
        flag all;
      }
        dhcpv6 {
          authentication {
            password delpref;
            username-include {
              user-prefix localpool;
            }
          }
          group one {
            authentication {
              password delpref;
              username-include {
                user-prefix localpool;
              }
            }
            dynamic-profile dhcp-demux-prof use-primary all-profile;
            interface ge-0/0/3.0;
          }
        }
        group v6 {
          authentication {
            password delpref;
            username-include {
              user-prefix localpool;
            }
          }
          dynamic-profile dynamic-profile dhcp-demux-prof use-primary all-profile;
          interface ge-1/2/0.0;
        }
      }
    }
  }
  interfaces {
    ge-1/0/0 {
      vlan-tagging;
```

```
        auto-configure {
            vlan-ranges {
                dynamic-profile vlan-profile {
                    accept inet6;
                    ranges {
                        any;
                    }
                }
            }
        }
    }
    ge-1/2/0 {
        flexible-vlan-tagging;
        auto-configure {
            vlan-ranges {
                dynamic-profile vlan-profile {
                    accept inet6;
                    ranges {
                        any;
                    }
                }
            }
            stacked-vlan-ranges {
                dynamic-profile svlan-profile {
                    accept inet6;
                    ranges {
                        any,any;
                    }
                }
            }
        }
    }
    lo0 {
        unit 0 {
            family inet {
                address 100.20.32.2/32;
            }
            family inet6 {
                address ::100.20.32.2/128;
            }
        }
    }
}
access {
    address-assignment {
        pool v6 {
            family inet6 {
                network 100.20.0.0/16;
                range limited {
                    low 100.20.0.10;
                    high 100.20.128.250;
                }
                dhcp-attributes {
                    maximum-lease-time 84600;
                }
            }
```

```
        }
      }
    }
```

Related Documentation

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 403

Example: Configuring a Dynamic IP Demux Interface with Dual Stacking

In this example, the network administrator configures IPv4 and IPv6 addressing for a dynamic IP demux interface with a group of underlying static VLANs.

```
[edit]
dynamic-profiles {
  dhcp-demux-prof {
    interfaces {
      demux0 {
        unit "$junos-interface-unit" {
          demux-options {
            underlying-interface "$junos-underlying-interface";
          }
          family inet {
            demux-source {
              $junos-subscriber-ip-address;
            }
            unnumbered-address lo0.0 preferred-source-address 3.1.1.1;
          }
          family inet6 {
            demux-source {
              $junos-subscriber-ipv6-address;
            }
            unnumbered-address lo0.0 preferred-source-address 2001:db8:ffff:1::1;
          }
        }
      }
    }
  }
  all-profile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit";
      }
    }
  }
}
services {
  dhcp-local-server {
    traceoptions {
      file dhcp size 1g;
      flag all;
    }
    dhcpv6 {
      authentication {
        password delpref;
```

```
        username-include {
          user-prefix localpool;
        }
      }
      group groupv6 {
        authentication {
          password delpref;
          username-include {
            user-prefix localpool;
          }
        }
        dynamic-profile dhcp-demux-prof use-primary all-profile;
        interface ge-0/0/3.0;
      }
    }
    group groupv4 {
      authentication {
        password delprefv4;
        username-include {
          user-prefix localpoolv4;
        }
      }
      dynamic-profile dhcp-demux-prof;
      interface ge-0/0/2.0;
    }
  }
  processes {
    general-authentication-service {
      traceoptions {
        file auth;
        flag all;
      }
    }
  }
  interfaces {
    ge-0/0/0 {
      unit 0 {
        proxy-arp;
        family inet6 {
          address 4ffe::1:1/48;
        }
      }
    }
    ge-0/0/1 {
      vlan-tagging;
      gigether-options {
        no-auto-negotiation;
      }
      unit 10 {
        vlan-id 10;
        family inet {
          address 100.10.0.2/24;
        }
      }
    }
    ge-0/0/2 {
```

```
        unit 0 {
            demux-source inet;
            proxy-arp;
            family inet {
                unnumbered-address lo0.0 preferred-source-address 3.1.1.1;
            }
        }
    }
    ge-0/0/3 {
        unit 0 {
            demux-source inet6;
            proxy-arp;
            family inet6 {
                unnumbered-address lo0.0 preferred-source-address 2001:db8:ffff:1::1;
            }
        }
    }
    lo0 {
        unit 0 {
            family inet {
                address 3.1.1.1/32;
            }
            family inet6 {
                address 2001:db8:ffff:1::1/128;
            }
        }
    }
}
access {
    radius-server {
        100.10.0.1 {
            port 1812;
            secret "$9$xs5-dsgoGDjqgo"; ## SECRET-DATA
        }
    }
    profile wash-test {
        accounting-order radius;
        authentication-order radius;
        radius {
            authentication-server 100.10.0.1;
            accounting-server 100.10.0.1;
        }
        accounting {
            order radius;
            accounting-stop-on-failure;
            accounting-stop-on-access-deny;
            update-interval 10;
            statistics time;
        }
    }
    address-assignment {
        pool v4ville {
            family inet {
                network 3.1.1.0/24;
                range testv4 {
                    low 3.1.1.3;
```

```
                high 3.1.1.50;
              }
            }
          }
          pool v6ville {
            family inet6 {
              prefix 2001:db8:ffff::/48;
              range test {
                low 2001:db8:ffff:1::2/128;
                high 2001:db8:ffff:1::ffff/128;
              }
            }
          }
        }
      }
    }
    [edit]
    dynamic-profiles {
      dhcp-demux-profile {
        interfaces {
          demux0 {
            unit "$junos-interface-unit" {
              demux-options {
                underlying-interface "$junos-underlying-interface";
              }
              family inet {
                demux-source {
                  $junos-subscriber-ip-address;
                }
                unnumbered-address ge-0/0/0.0 preferred-source-address 1.1.1.2;
              }
              family inet6 {
                demux-source {
                  $junos-subscriber-ipv6-address;
                }
                unnumbered-address ge-0/0/3.0 preferred-source-address ::22.22.22.2;
              }
            }
          }
        }
      }
    }
```

Related Documentation

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 403

Example: Configuring IPv4 Static VLAN Demux Interfaces Over a Gigabit Ethernet Underlying Interface with DHCP Local Server

This example shows how to configure a static IPv4 VLAN demux interface with gigabit Ethernet as the underlying interface. DHCP Local Server configuration enables the association of subscribers to the VLAN demux interface by listing the gigabit Ethernet interface in the DHCP local server configuration.

To configure dynamic subscribers on VLAN demux interfaces:

1. Enable VLAN tagging on the underlying interface that you plan to use for the VLAN demux interfaces.

```
interfaces {
  ge-5/0/0 {
    vlan-tagging;
  }
}
```

2. Define the loopback interface.

```
interfaces {
  lo0 {
    unit 0 {
      family inet {
        address 192.16.1.1/32;
      }
    }
  }
}
```

3. Define the demux interface.

```
interfaces {
  demux0 {
    unit 102 {
      proxy-arp;
      vlan-id 103;
      demux-options {
        underlying-interface ge-5/0/0;
      }
      family inet {
        unnumbered-address lo0.0 preferred-source-address 173.16.1.1;
      }
    }
  }
}
```

4. Configure a dynamic profile for subscriber access.

```
dynamic-profiles {
  user-profile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit" {
          family inet;
        }
      }
    }
  }
}
```

5. Configure the access method used to dynamically create the subscriber interfaces.

   The following stanza specifies the gigabit Ethernet interface (**ge-5/0/0.0**) for use with the dynamically-created subscriber interfaces.

```
system {
   services {
      dhcp-local-server {
         group myDhcpGroup {
            authentication {
               password test;
               username-include {
                  user-prefix igmp-user1;
               }
            }
            dynamic-profile user-profile;
            interface ge-5/0/0.0;
         }
      }
   }
}
```

Instead of using the gigabit Ethernet interface, you can alternatively specify the specific demux interface (**demux0.102**) as the device to use with the subscriber interfaces as follows:

```
system {
   services {
      dhcp-local-server {
         group myDhcpGroup {
            authentication {
               password test;
               username-include {
                  user-prefix igmp-user1;
               }
            }
            dynamic-profile user-profile;
            interface demux0.102;
         }
      }
   }
}
```

Related Documentation

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 403
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109

Example: Configuring IPv4 Dynamic VLAN Demux Interfaces Over a Gigabit Ethernet Underlying Interface with DHCP Local Server

This example shows how to configure the dynamic creation of IPv4 VLAN demux interfaces with gigabit Ethernet as the underlying interface. DHCP Local Server configuration enables the association of subscribers to the VLAN demux interface by listing the aggregated Ethernet interface in the DHCP local server configuration.

To configure dynamic subscribers on dynamic VLAN demux interfaces:

1. Enable VLAN tagging and VLAN auto-configuration on the underlying gigabit Ethernet interface that you plan to use for dynamically created VLAN demux interfaces.

```
interfaces {
  ge-5/0/0 {
    hierarchical-scheduler;
    vlan-tagging;
    auto-configure {
      vlan-ranges {
        dynamic-profile auto-vlanDemux-profile {
          accept inet;
          ranges {
            103-103;
          }
        }
      }
    }
  }
}
```

2. Define the loopback interface.

```
interfaces {
  lo0 {
    unit 0 {
      family inet {
        address 192.16.1.1/32;
      }
    }
  }
}
```

3. Configure a dynamic profile for subscriber access.

```
dynamic-profiles {
  user-profile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit" {
          family inet;
        }
      }
    }
  }
}
```

4. Configure a dynamic profile for VLAN demux interface creation.

```
dynamic-profiles {
  auto-vlanDemux-profile {
    interfaces {
      demux0 {
        unit "$junos-interface-unit" {
          vlan-id "$junos-vlan-id";
          demux-options {
            underlying-interface "$junos-interface-ifd-name";
```

```
            }
            family inet {
              filter {
                input rate_limit;
                output rate_limit;
              }
              unnumbered-address lo0.0 preferred-source-address 192.16.1.1;
            }
          }
        }
      }
    }
  }
```

5. Configure the access method used to dynamically create the subscriber interfaces. The following stanza specifies the gigabit Ethernet interface (**ge-5/0/0.0**) for use with the dynamically-created subscriber interfaces.

```
system {
  services {
    dhcp-local-server {
      group myDhcpGroup {
        authentication {
          password test;
          username-include {
            user-prefix igmp-user1;
          }
        }
        dynamic-profile user-profile;
        interface ge-5/0/0.0;
      }
    }
  }
}
```

Instead of using the gigabit Ethernet interface, you can alternatively specify **demux0** as the device to use with the subscriber interfaces as follows:

NOTE: Because the demux interfaces and unit numbers are created dynamically, the unit number is not specified for the demux0 interface.

```
system {
  services {
    dhcp-local-server {
      group myDhcpGroup {
        authentication {
          password test;
          username-include {
            user-prefix igmp-user1;
          }
        }
        dynamic-profile user-profile;
        interface demux0;
      }
```

```
    }
  }
}
```

Related Documentation

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 403
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109

Example: Configuring CoS on Static LSQ MLPPP Bundle Interfaces

This example shows how to configure dynamic subscriber services on MLPPP bundle interfaces. The MLPPP bundles must be configured on link services intelligent queuing (IQ) (LSQ) interfaces. The MLPPP interfaces must be statically configured.

To configure dynamic subscriber services on static LSQ MLPPP bundle interfaces:

1. Configure class of service features for the LSQ interfaces.

```
[edit]
class-of-service
  classifiers {
    inet-precedence inet_classifier {
      forwarding-class best-effort {
        loss-priority low code-points 000;
      }
      forwarding-class expedited-forwarding {
        loss-priority low code-points 011;
      }
      forwarding-class assured-forwarding {
        loss-priority low code-points 100;
      }
    }
  }
  fragmentation-maps {
    sample-fragmap {
      forwarding-class {
        best-effort {
          fragment-threshold 1000;
          multilink-class 1:
        }
        assured-forwarding {
          fragment-threshold 1000;
          multilink-class 2:
        }
        expedited-forwarding {
          multilink-class 3:
        }
      }
    }
  }
  forwarding-classes {
    queue 0 best-effort;
    queue 1 expedited-forwarding;
```

```
    queue 2 assured-forwarding;
  }
  # traffic classifiers are statically defined
  network traffic interface{
    classifiers {
      inet-precedence inet_classifier;
    }
  }
  scheduler-maps {
    allthree {
      forwarding-class best-effort scheduler be-scheduler;
      forwarding-class expedited-forwarding scheduler hiprior-sched;
      forwarding-class assured-forwarding scheduler vpn-sched;
    }
  }
  schedulers {
    be-scheduler {
      transmit-rate percent 30;
      priority low;
    }
    hiprior-scheduler {
      transmit-rate percent 40;
      priority strict-high;
    }
    vpn-sched {
      transmit-rate percent 30;
      medium-high;
    }
  }
}
```

2. Configure the MLPPP bundle interfaces and the LSQ interfaces.

```
[edit interfaces]
t1-3/1/0:1:1 {
  keepalives interval 600;
  encapsulation ppp;
  unit 0 {
    ppp-options {
      lcp-restart-timer 5000;
    }
    family mlppp {
      bundle lsq-3/3/0.0;
    }
  }
}
t1-3/1/0:1:2 {
  keepalives interval 600;
  encapsulation ppp;
  unit 0 {
    ppp-options {
      lcp-restart-timer 5000;
    }
    family mlppp {
      bundle lsq-3/3/0.0;
    }
```

```
    }
  }
  lsq-3/3/0 {
    unit 0 {
      encapsulation multilink-ppp;
      multilink-max-classes 4;
      ppp-options {
        ncp-restart-timer 10000;
        dynamic-profile mlppp-profile;
      }
      family inet {
        address 192.168.1.1/32 {
          destination 192.168.25.45;
        }
      }
    }
  }
```

3. Configure the dynamic profile that is applied to the MLPPP bundle interfaces.

```
[edit]
dynamic-profiles {
  mlppp-profile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit junos-underlying-interface-unit" {
          family inet {
            filter {
              input "$junos-input-filter";
              output "$junos-output-filter";
            }
          }
        }
      }
    }
    class-of-service {
      interfaces {
        "$junos-interface-ifd-name" {
          unit junos-underlying-interface-unit" {
            output-traffic-control-profile tcp1;
            fragmentation-map sample-fragmap;
          }
        }
      }
      traffic-control-profiles {
        tcp1 {
          scheduler-map "junos-cos-scheduler-map";
          shaping-rate "$junos-cos-shaping-rate";
          guaranteed-rate "$junos-cos-guaranteed-rate";
          delay-buffer-rate "$junos-cos-delay-buffer-rate";
        }
      }
      scheduler-maps {
        data_smap {
          forwarding-class be scheduler data_sch;
        }
```

```
        }
        schedulers {
          be_sch {
            ...
          }
        }
      }
    }
  }
```

Related Documentation

- For hardware requirements, see Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces on page 206
- For information about MLPPP and LSQ interfaces, see *Link Services IQ Interfaces Configuration* in the *Services Interfaces Configuration Guide*.

CHAPTER 39

Subscriber Interfaces over Aggregated Ethernet Overview

Static and Dynamic VLAN Subscriber Interfaces over Aggregated Ethernet Overview

You can configure a subscriber interface represented by a static virtual LAN (VLAN) stacked on a two-link aggregated Ethernet logical interface. You must configure the aggregated Ethernet logical interface on Enhanced Queuing Dense Port Concentrators (EQ DPCs) or Trio MPC/MIC interfaces in MX Series Ethernet Services Routers.

A static or dynamic VLAN subscriber interface over aggregated Ethernet can also support one-to-one active/backup link redundancy, depending on how you configure the underlying aggregated Ethernet interface.

To configure a static or dynamic VLAN subscriber interface over aggregated Ethernet, make sure you understand the following concepts.

Guidelines for Configuring an Aggregated Ethernet Logical Interface to Support a Static or Dynamic VLAN Subscriber Interface

The following guidelines for configuring an aggregated Ethernet logical interface also apply to configuring a static or dynamic VLAN subscriber interface stacked on a two-link aggregated Ethernet logical interface:

- If you need to support one-to-one active/backup link redundancy, configure the aggregated Ethernet interface in link protection mode, which requires that the two underlying physical interfaces be designated as primary and backup links.
- In addition, if you need to support one-to-one active/backup link redundancy at the DPC or MPC level, configure the aggregated Ethernet interface on physical interfaces that reside on different EQ DPC or Trio MPC modules.

NOTE: One-to-one active/backup DPC redundancy is also supported with firewall filters and policy filters for static non-VLAN interfaces configured on an aggregated Ethernet logical interfaces, provided LACP is not active.

Related Documentation

- Static Subscriber Interfaces and VLAN Overview on page 392
- Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet on page 433
- Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet on page 439
- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- CoS for Subscriber Access Overview on page 591

Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview

You can configure a subscriber interface using a static or dynamic demux interface stacked on an aggregated Ethernet logical interface. Subscriber interfaces on static or dynamic demux interfaces can be used to identify specific subscribers (authenticated users) in an access network or to separate individual circuits. A subscriber interface on a static or dynamic demux interface over aggregated Ethernet can support one-to-one active/backup link redundancy or traffic load balancing, depending on how you configure the underlying aggregated Ethernet interface.

To configure a static or dynamic demux subscriber interface over aggregated Ethernet, make sure you understand the following concepts:

- Options for Aggregated Ethernet Logical Interfaces That Support Demux Subscriber Interfaces on page 430
- Features Supported with Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet on page 431

Options for Aggregated Ethernet Logical Interfaces That Support Demux Subscriber Interfaces

Traffic forwarding through a demux logical interface is dependent on the configuration of the underlying interface. Using an aggregated Ethernet interface as the underlying interface for a static or dynamic demux subscriber interface provides you with the following options:

- **1:1 Active/Backup Link Redundancy**—If you need to support one-to-one active/backup link redundancy, configure the aggregated Ethernet interface in link protection mode, which requires that two underlying physical interfaces be designated as primary and backup links. In addition, if you need to support one-to-one active/backup link redundancy at the DPC level, configure the aggregated Ethernet interface on physical interfaces that reside on different EQ DPCs. Link protection is required when configuring hierarchical CoS on the subscriber interface.

- **Load Balancing**—If you need to support traffic load balancing instead of redundancy, configure the aggregated Ethernet interface to operate in Link Aggregation Control Protocol (LACP) active mode. When using LACP link protection, you can configure only two member links to an aggregated Ethernet interface: one active and one standby. The Junos implementation of the IEEE 802.3ad standard balances traffic across the member links within an aggregated Ethernet bundle based on the Layer 3 information carried in the packet.

For more information about aggregated Ethernet interfaces, see the *Junos OS Network Interfaces Configuration Guide*.

Features Supported with Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet

Table 44 on page 431 lists key subscriber access features supported with static or dynamic demux subscriber interfaces, organized by type of underlying interface:

- Aggregated Ethernet
- Non-aggregated Ethernet (Gigabit Ethernet, Fast Ethernet, or 10-Gigabit Ethernet)

There are no feature limitations specific to demultiplexing. Instead, demux interfaces over aggregated Ethernet are subject to the same scaling and configuration limitations inherent to aggregated Ethernet logical interfaces.

Table 44: Features Supported with Static or Dynamic Demux Subscriber Interfaces

Feature	Static or Dynamic Demux Subscriber Interface	
	Aggregated Ethernet Underlying Interface	Non-aggregated Underlying Logical Interface
Protocol family support	IPv4 and IPv6	IPv4 and IPv6
Per-subscriber firewall filtering and statistics	Supported	Supported
Hierarchical CoS	Supported	Supported
Per-subscriber CoS parameters within the **[edit dynamic-profiles *profile-name* class-of-service]** hierarchy	Supported	Supported
Per-subscriber IGMP configuration within the **[edit dynamic-profiles *profile-name* protocols]** hierarchy NOTE: IP demux interfaces must use OIF mapping. See Configuring Multicast Outgoing Interface Mapping in the *Multicast Protocols Configuration Guide* for additional information.	Yes	Yes

Related Documentation

- Subscriber Interfaces and Demultiplexing Overview on page 393
- Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet on page 434

- Example: Configuring a Static Subscriber Interface on an IP Demux Interface over Aggregated Ethernet on page 442

CHAPTER 40

Configuring Subscriber Interfaces over Aggregated Ethernet

Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet

You can configure a subscriber link represented by a static virtual LAN (VLAN) stacked on an aggregated Ethernet logical interface.

You can configure subscriber management services such as firewall filters and CoS for this subscriber interface.

To configure a subscriber interface using a static VLAN interface over an aggregated Ethernet logical interface:

1. Configure the aggregated Ethernet interface.
   a. Configure the number of aggregated Ethernet interfaces on the router.

      See Configuring the Number of Aggregated Ethernet Interfaces on the Device.

   b. Configure the aggregated Ethernet interface.

      See Configuring an Aggregated Ethernet Interface.

   c. (Optional) Configure LACP.

      See Configuring Aggregated Ethernet LACP.

   d. (Optional) Configure the minimum number of links.

      See Configuring Aggregated Ethernet Minimum Links.

   e. (Optional) Configure the link speed.

See Configuring Aggregated Ethernet Link Speed.

f. (Optional) Configure the aggregated Ethernet logical interface to support one-to-one active/backup link redundancy or traffic load balancing.

See Configuring Aggregated Ethernet Link Protection.

NOTE: Link protection is required if you want to configure hierarchical CoS on the aggregated Ethernet interface. For more information, see "Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links" on page 639.

2. Configure the static or dynamic VLAN interface.
   - For static VLAN interfaces, see "Configuring a Subscriber Interface with a Static VLAN Interface" on page 398.
   - For dynamic VLAN interfaces, see "Configuring VLAN Dynamic Profiles" on page 367 and "Configuring VLAN Interfaces to Use Dynamic Profiles" on page 374.
3. Configure subscriber management services on the subscriber interface.
   - For firewall filters, see "Dynamically Attaching Statically Created Filters for Any Interface Type" on page 504 or "Dynamically Attaching Statically Created Filters for a Specific Interface Family Type" on page 503.
   - For hierarchical CoS, see "Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links" on page 639.

Related Documentation

- Static and Dynamic VLAN Subscriber Interfaces over Aggregated Ethernet Overview on page 429
- Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet on page 439
- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- CoS for Subscriber Access Overview on page 591

Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet

You can configure a subscriber interface using a static or dynamic IP demultiplexing (demux) logical interface stacked on an aggregated Ethernet logical interface. Optionally, you can configure the aggregated Ethernet logical interface to support one-to-one active/backup link redundancy or traffic load balancing.

1. Configure the aggregated Ethernet interface.
   a. Configure the number of aggregated Ethernet interfaces on the router.

      See Configuring the Number of Aggregated Ethernet Interfaces on the Device.

   b. Configure the aggregated Ethernet interface.

      See Configuring an Aggregated Ethernet Interface.

   c. (Optional) Configure LACP.

      See Configuring Aggregated Ethernet LACP.

   d. (Optional) Configure the minimum number of links.

      See Configuring Aggregated Ethernet Minimum Links.

   e. (Optional) Configure the link speed.

      See Configuring Aggregated Ethernet Link Speed.

   f. (Optional) Configure the aggregated Ethernet logical interface to support one-to-one active/backup link redundancy or traffic load balancing.

      For general instructions, see Configuring Aggregated Ethernet Link Protection.

      NOTE: Link protection is required if you want to configure hierarchical CoS on the aggregated Ethernet interface. For more information, see "Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links" on page 639.

2. Configure the aggregated Ethernet logical interface as the underlying interface to support the static or dynamic IP demux subscriber interface.

   The aggregated Ethernet interface needs to support demultiplexing of incoming traffic to the Ethernet links based on IPv4 destination or source addresses in the incoming packets. In addition, you must configure the IP address of each link.

   See Configuring an IP Demux Underlying Interface.

3. Configure the static or dynamic IP demux interface.
   - For static subscriber interfaces, see "Configuring Static Subscriber Interfaces Using IP Demux Interfaces" on page 398.
   - For dynamic subscriber interfaces, see "Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles" on page 403.

   NOTE: IP demux interfaces currently support only the Internet Protocol version 4 (IPv4) suite (**family inet**).

4. (Optional) Configure subscriber management services on the subscriber interface.

- For firewall filters, see “Dynamically Attaching Statically Created Filters for Any Interface Type” on page 504 or “Dynamically Attaching Statically Created Filters for a Specific Interface Family Type” on page 503.
- For hierarchical CoS, see “Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links” on page 639.

Related Documentation

- Subscriber Interfaces and Demultiplexing Overview on page 393
- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 430
- Example: Configuring a Static Subscriber Interface on an IP Demux Interface over Aggregated Ethernet on page 442

Configuring a Static or Dynamic VLAN Demux Subscriber Interface over Aggregated Ethernet

You can configure a subscriber interface using a static or dynamic VLAN demultiplexing (demux) logical interface stacked on an aggregated Ethernet physical interface.

1. Configure the aggregated Ethernet interface.
   a. Configure the number of aggregated Ethernet interfaces on the router.

      See Configuring the Number of Aggregated Ethernet Interfaces on the Device.

   b. Configure the aggregated Ethernet interface.

      See Configuring an Aggregated Ethernet Interface.

   c. (Optional) Configure LACP.

      See Configuring Aggregated Ethernet LACP.

   d. (Optional) Configure the minimum number of links.

      See Configuring Aggregated Ethernet Minimum Links.

   e. (Optional) Configure the link speed.

      See Configuring Aggregated Ethernet Link Speed.

   f. (Optional) Configure the aggregated Ethernet logical interface to support one-to-one active/backup link redundancy or traffic load balancing.

      For general instructions, see Configuring Aggregated Ethernet Link Protection.

2. Configure the aggregated Ethernet physical interface as the underlying interface to support the static or dynamic VLAN demux subscriber interface.

   The aggregated Ethernet interface needs to support demultiplexing of incoming traffic to the Ethernet links based on the VLAN ID in the incoming packets.

   See Configuring a VLAN Demux Underlying Interface.

3. Configure the static or dynamic VLAN demux interface.
   - For static subscriber interfaces, see “Configuring Static Subscriber Interfaces Using VLAN Demux Interfaces” on page 399.
   - For dynamic subscriber interfaces, see “Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles” on page 404.

NOTE: VLAN demux interfaces currently support the Internet Protocol version 4 (IPv4) suite (**family inet**) and the Internet Protocol version 6 (IPv6) suite (**family inet6**).

4. (Optional) Configure subscriber management services on the subscriber interface.
   - For firewall filters, see “Dynamically Attaching Statically Created Filters for Any Interface Type” on page 504 or “Dynamically Attaching Statically Created Filters for a Specific Interface Family Type” on page 503.
   - For hierarchical CoS, see “Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links” on page 639.

Related Documentation

- Subscriber Interfaces and Demultiplexing Overview on page 393
- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 430
- Associating VLAN IDs to VLAN Demux Interfaces
- Example: Configuring IPv4 Static VLAN Demux Interfaces Over a Gigabit Ethernet Underlying Interface with DHCP Local Server on page 420
- Example: Configuring IPv4 Static VLAN Demux Interfaces Over an Aggregated Ethernet Underlying Interface with DHCP Local Server on page 447
- Example: Configuring IPv4 Dynamic VLAN Demux Interfaces Over a Gigabit Ethernet Underlying Interface with DHCP Local Server on page 422
- Example: Configuring IPv4 Dynamic VLAN Demux Interfaces Over an Aggregated Ethernet Underlying Interface with DHCP Local Server on page 449

CHAPTER 41

Subscriber Interfaces over Aggregated Ethernet Examples

Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet

This example shows how you can configure a subscriber interface using a static virtual LAN (VLAN) stacked on a two-link aggregated Ethernet logical interface. In this example, the underlying aggregated Ethernet logical interface is configured for one-to-one active/backup redundancy at the DPC level, and per-subscriber static hierarchical class-of-service (CoS) is configured by applying CoS parameters at the aggregated Ethernet logical interface.

1. Define the number of aggregated Ethernet interfaces on the router.

   In this example, only one aggregated Ethernet logical interface is configured on the router.

   ```
   [edit]
   chassis {
     aggregated-devices {
       ethernet {
         device-count 1;
   ```

```
    }
  }
}
```

2. Configure **ae0**, a two-link aggregated Ethernet logical interface to serve as the underlying interface for the static VLAN subscriber interface. In order to support hierarchical CoS, the physical ports must be on EQ DPCs in MX Series routers.

   In this example, the LAG bundle is configured for one-to-one active/backup link redundancy. To support link redundancy at the DPC level, the LAG bundle attaches ports from two different EQ DPCs.

```
[edit]
interfaces {
  ge-5/0/3 {
    gigether-options {
      802.3ad {
        ae0;
        primary;
      }
    }
    ge-5/1/2 {
      gigether-options {
        802.3ad {
          ae0;
          backup;
        }
      }
    }
  }
}
```

3. Configure **ae0** to serve as the underlying interface for the static VLAN interface.

```
[edit]
interfaces {
  ae0 {
    hierarchical-scheduler;
    aggregated-ether-options {
      link-protection;
      minimum-links 1;
      link-speed 1g;
      lacp {
        active;
      }
    }
  }
}
```

4. Configure static traffic-shaping and scheduling parameters.

```
[edit]
class-of-service {
  forwarding-classes { # Associate queue numbers with class names
    queue 0 be;
    queue 1 e;
    queue 2 af;
    queue 3 nc;
```



```
    }
    schedulers { # Define output queue properties
      scheduler_be {
        transmit-rate percent 30;
        buffer-size percent 30;
      }
      scheduler_ef {
        transmit-rate percent 40;
        buffer-size percent 40;
      }
      scheduler_af {
        transmit-rate percent 25;
        buffer-size percent 25;
      }
      scheduler_nc {
        transmit-rate percent 5;
        buffer-size percent 5;
      }
    }
    scheduler-maps { # Associate queues with schedulers
      smap_2 {
        forwarding-class be scheduler_be;
        forwarding-class ef scheduler_ef;
        forwarding-class-af scheduler_af;
        forwarding-class-nc scheduler_nc;
      }
    }
  }
```

5. Attach static CoS to the physical and logical interfaces of the aggregated Ethernet interface.

   In this example, three traffic control profiles are defined, but only two profiles are applied to the static VLAN subscriber interface over aggregated Ethernet:

   - The **tcp_for_ae_device_pir_500m** profile defines a shaping rate, and it is applied to both of the underlying physical interfaces (**ge-5/0/3** and **ge-5/1/2**).
   - The **tcp-for-ae_smap_video_pir_20m_delay_30m** profile defines a scheduler map, a shaping rate, and a delay buffer rate, and it is applied to one of the logical interfaces on the aggregated Ethernet bundle (**ae0.0**).

   ```
   [edit]
   class-of-service {
     traffic-control-profiles { # Configure traffic shaping and scheduling profiles
       tcp_for_ae_device_pir_500m {
         shaping-rate 20m;
       }
       tcp_for_ae_smap_video_pir_20m_delay_30m {
         scheduler-map smap_video;
         shaping-rate 20m;
         delay-buffer-rate 30m;
       }
       tcp_for_ae_smap_video_cir_50m_delay_75m {
         scheduler-map smap_video;
         guaranteed-rate 50m;
   ```

```
        delay-buffer-rate 75m;
      }
    }
    interfaces { # Apply two traffic-control profiles to the LAG
      ae0 { # Two underlying physical interfaces on separate EQ DPCs
        output-traffic-control-profile tcp-for-ae_device_pir_500m;
        unit 0 { # One of the two logical interfaces on 'ae0'
          output-traffic-control-profile tcp-for-ae_smap_video_pir_20m_delay_30m;
        }
      }
    }
  }
```

Related Documentation

- Static and Dynamic VLAN Subscriber Interfaces over Aggregated Ethernet Overview on page 429
- Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet on page 433
- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- CoS for Subscriber Access Overview on page 591

Example: Configuring a Static Subscriber Interface on an IP Demux Interface over Aggregated Ethernet

This example shows how you can configure a subscriber interface using a static IP demultiplexing (demux) interface stacked on a two-link aggregated Ethernet logical interface. In this example, the underlying aggregated Ethernet logical interface is configured for one-to-one active/backup redundancy at the DPC level.

1. Define the number of aggregated Ethernet interfaces on the router.

   In this example, only one aggregated Ethernet logical interface is configured on the router:

   ```
   [edit]
   chassis {
     aggregated-devices {
       ethernet {
         device-count 1;
       }
     }
   }
   ```

2. Configure **ae0**, a two-link aggregated Ethernet logical interface to serve as the underlying interface for the static IP demux subscriber interface.

   In this example, the LAG bundle is configured for one-to-one active/backup link redundancy. To support link redundancy at the DPC level, the LAG bundle attaches ports from two different EQ DPCs.

   ```
   [edit]
   interfaces {
     ge-5/0/3 {
   ```

```
    gigether-options {
      802.3ad {
        ae0;
        primary;
      }
    }
  }
  ge-5/1/2 {
    gigether-options {
      802.3ad {
        ae0;
        backup;
      }
    }
  }
}
```

3. Configure the aggregated Ethernet logical interface with link protection enabled, and specify the logical demultiplexing source family type for both the active and backup links.

```
[edit]
interfaces {
  ae0 {
    aggregated-ether-options {
      link-protection;
      minimum-links 1;
      link-speed 1g;
    }
    unit 0 {
      demux-source inet {
      family inet {
        address 20.1.1.0/24;
      }
    }
    unit 1 {
      demux-source inet {
      family inet {
        address 20.1.1.1/24;
      }
    }
  }
}
```

4. Configure the IP demux interface over the aggregated Ethernet logical interface.

```
[edit]
interfaces {
  demux0 {
    unit 101 {
      demux-options {
        underlying-interface ae0.0;
      }
      family inet {
        demux-source 10.1.0.0/16;
        address 1.1.1.0/24;
      }
```

```
    }
    unit 101 {
      demux-options {
        underlying-interface ae0.1;
      }
      family inet {
        demux-source 10.1.0.1/16;
        address 1.1.1.1/24;
      }
    }
  }
}
```

Related Documentation

- Subscriber Interfaces and Demultiplexing Overview on page 393
- Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview on page 430
- Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet on page 434

Example: Configuring a Static Subscriber Interface on a VLAN Interface over Aggregated Ethernet

This example shows how you can configure a subscriber interface using a static virtual LAN (VLAN) stacked on a two-link aggregated Ethernet logical interface. In this example, the underlying aggregated Ethernet logical interface is configured for one-to-one active/backup redundancy at the DPC level, and per-subscriber static hierarchical class-of-service (CoS) is configured by applying CoS parameters at the aggregated Ethernet logical interface.

1. Define the number of aggregated Ethernet interfaces on the router.

   In this example, only one aggregated Ethernet logical interface is configured on the router.

   ```
   [edit]
   chassis {
     aggregated-devices {
       ethernet {
         device-count 1;
       }
     }
   }
   ```

2. Configure **ae0**, a two-link aggregated Ethernet logical interface to serve as the underlying interface for the static VLAN subscriber interface. In order to support hierarchical CoS, the physical ports must be on EQ DPCs in MX Series routers.

   In this example, the LAG bundle is configured for one-to-one active/backup link redundancy. To support link redundancy at the DPC level, the LAG bundle attaches ports from two different EQ DPCs.

   ```
   [edit]
   interfaces {
   ```

```
    ge-5/0/3 {
      gigether-options {
        802.3ad {
          ae0;
          primary;
        }
      }
      ge-5/1/2 {
        gigether-options {
          802.3ad {
            ae0;
            backup;
          }
        }
      }
    }
}
```

3. Configure **ae0** to serve as the underlying interface for the static VLAN interface.

```
[edit]
interfaces {
  ae0 {
    hierarchical-scheduler;
    aggregated-ether-options {
      link-protection;
      minimum-links 1;
      link-speed 1g;
      lacp {
        active;
      }
    }
  }
}
```

4. Configure static traffic-shaping and scheduling parameters.

```
[edit]
class-of-service {
  forwarding-classes { # Associate queue numbers with class names
    queue 0 be;
    queue 1 e;
    queue 2 af;
    queue 3 nc;
  }
  schedulers { # Define output queue properties
    scheduler_be {
      transmit-rate percent 30;
      buffer-size percent 30;
    }
    scheduler_ef {
      transmit-rate percent 40;
      buffer-size percent 40;
    }
    scheduler_af {
      transmit-rate percent 25;
      buffer-size percent 25;
```

```
    }
    scheduler_nc {
      transmit-rate percent 5;
      buffer-size percent 5;
    }
  }
  scheduler-maps { # Associate queues with schedulers
    smap_2 {
      forwarding-class be scheduler_be;
      forwarding-class ef scheduler_ef;
      forwarding-class-af scheduler_af;
      forwarding-class-nc scheduler_nc;
    }
  }
}
```

5. Attach static CoS to the physical and logical interfaces of the aggregated Ethernet interface.

   In this example, three traffic control profiles are defined, but only two profiles are applied to the static VLAN subscriber interface over aggregated Ethernet:

   - The **tcp_for_ae_device_pir_500m** profile defines a shaping rate, and it is applied to both of the underlying physical interfaces (**ge-5/0/3** and **ge-5/1/2**).
   - The **tcp-for-ae_smap_video_pir_20m_delay_30m** profile defines a scheduler map, a shaping rate, and a delay buffer rate, and it is applied to one of the logical interfaces on the aggregated Ethernet bundle (**ae0.0**).

   ```
   [edit]
   class-of-service {
     traffic-control-profiles { # Configure traffic shaping and scheduling profiles
       tcp_for_ae_device_pir_500m {
         shaping-rate 20m;
       }
       tcp_for_ae_smap_video_pir_20m_delay_30m {
         scheduler-map smap_video;
         shaping-rate 20m;
         delay-buffer-rate 30m;
       }
       tcp_for_ae_smap_video_cir_50m_delay_75m {
         scheduler-map smap_video;
         guaranteed-rate 50m;
         delay-buffer-rate 75m;
       }
     }
     interfaces { # Apply two traffic-control profiles to the LAG
       ae0 { # Two underlying physical interfaces on separate EQ DPCs
         output-traffic-control-profile tcp-for-ae_device_pir_500m;
         unit 0 { # One of the two logical interfaces on 'ae0'
           output-traffic-control-profile tcp-for-ae_smap_video_pir_20m_delay_30m;
         }
       }
     }
   }
   ```

Related Documentation

- Static and Dynamic VLAN Subscriber Interfaces over Aggregated Ethernet Overview on page 429
- Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet on page 433
- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- CoS for Subscriber Access Overview on page 591

Example: Configuring IPv4 Static VLAN Demux Interfaces Over an Aggregated Ethernet Underlying Interface with DHCP Local Server

This example shows how to configure a static IPv4 VLAN demux interface with aggregated Ethernet as the underlying interface. DHCP Local Server configuration enables the association of subscribers to the VLAN demux interface by listing the aggregated Ethernet interface in the DHCP local server configuration.

To configure dynamic subscribers on VLAN demux interfaces:

1. Enable hierarchical scheduling and VLAN tagging on the underlying interface that you plan to use for any VLAN demux interfaces.

```
interfaces {
  ae1 {
    hierarchical-scheduler;
    vlan-tagging;
    aggregated-ether-options {
      minimum-links 1;
      lacp {
        active;
        periodic slow;
        link-protection {
          non-revertive;
        }
      }
    }
  }
}
```

2. Define the gigabit Ethernet interfaces that are part of the aggregated Ethernet interface.

```
interfaces {
  ge-5/0/0 {
    gigether-options {
      802.3ad ae1;
    }
  }
  ge-5/2/0 {
    gigether-options {
      802.3ad ae1;
    }
  }
}
```

3. Define the demux interface.

```
interfaces {
  demux0 {
    unit 102 {
      proxy-arp;
      vlan-id 103;
      demux-options {
        underlying-interface ae1;
      }
      family inet {
        unnumbered-address lo0.0 preferred-source-address 173.16.1.1;
      }
    }
  }
}
```

4. Define the loopback interface.

```
interfaces {
  lo0 {
    unit 0 {
      family inet {
        address 192.16.1.1/32;
      }
    }
  }
}
```

5. Configure a dynamic profile for initial subscriber access.

```
dynamic-profiles {
  user-profile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit" {
          family inet;
        }
      }
    }
    protocols {
      igmp {
        interface "$junos-interface-name" {
          version 3;
          immediate-leave;
          promiscuous-mode;
        }
      }
    }
  }
}
```

6. Configure the access method used to dynamically create the subscriber interfaces.

   The following stanza specifies the aggregated Ethernet interface (**ae1.0**) for use with the dynamically-created subscriber interfaces.

```
system {
```

```
services {
  dhcp-local-server {
    group myDhcpGroup {
      authentication {
        password test;
        username-include {
          user-prefix igmp-user1;
        }
      }
      dynamic-profile user-profile;
      interface ae1.0;
    }
  }
}
```

Instead of using the aggregated Ethernet interface, you can alternatively specify the specific demux interface (**demux0.102**) as the device to use with the subscriber interfaces as follows:

```
system {
  services {
    dhcp-local-server {
      group myDhcpGroup {
        authentication {
          password test;
          username-include {
            user-prefix igmp-user1;
          }
        }
        dynamic-profile user-profile;
        interface demux0.102;
      }
    }
  }
}
```

Related Documentation

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 403
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109

Example: Configuring IPv4 Dynamic VLAN Demux Interfaces Over an Aggregated Ethernet Underlying Interface with DHCP Local Server

This example shows how to configure the dynamic creation of IPv4 VLAN demux interfaces with aggregated Ethernet as the underlying interface. DHCP Local Server configuration enables the association of subscribers to the VLAN demux interface by listing the aggregated Ethernet interface in the DHCP local server configuration.

To configure dynamic subscribers on dynamic VLAN demux interfaces:

1. Enable VLAN tagging and VLAN auto-configuration on the underlying aggregated Ethernet interface that you plan to use for dynamically created VLAN demux interfaces.

```
interfaces {
  ae1 {
    vlan-tagging;
    auto-configure {
      vlan-ranges {
        dynamic-profile auto-vlanDemux-profile {
          accept inet;
          ranges {
            any;
          }
        }
      }
    }
    aggregated-ether-options {
      minimum-links 1;
      lacp {
        active;
        periodic slow;
        link-protection {
          non-revertive;
        }
      }
    }
  }
}
```

2. Define the gigabit Ethernet interfaces that are part of the aggregated Ethernet interface.

```
interfaces {
  ge-5/0/0 {
    gigether-options {
      802.3ad ae1;
    }
  }
  ge-5/2/0 {
    gigether-options {
      802.3ad ae1;
    }
  }
}
```

3. Define the loopback interface.

```
interfaces {
  lo0 {
    unit 0 {
      family inet {
        address 192.16.1.1/32;
      }
    }
  }
}
```

4. Configure a dynamic profile for subscriber access.

```
dynamic-profiles {
  user-profile {
    interfaces {
```

```
        "$junos-interface-ifd-name" {
          unit "$junos-underlying-interface-unit" {
            family inet;
          }
        }
      }
    }
  }
```

5. Configure a dynamic profile for VLAN demux interface creation.

```
dynamic-profiles {
  auto-vlanDemux-profile {
    interfaces {
      demux0 {
        unit "$junos-interface-unit" {
          vlan-id "$junos-vlan-id";
          demux-options {
            underlying-interface "$junos-interface-ifd-name";
          }
          family inet {
            filter {
              input rate_limit;
              output rate_limit;
            }
            unnumbered-address lo0.0 preferred-source-address 192.16.1.1;
          }
        }
      }
    }
  }
}
```

6. Configure the access method used to dynamically create the subscriber interfaces. The following stanza specifies the aggregated Ethernet interface (**ae1.0**) for use with the dynamically-created subscriber interfaces.

```
system {
  services {
    dhcp-local-server {
      group myDhcpGroup {
        authentication {
          password test;
          username-include {
            user-prefix igmp-user1;
          }
        }
        dynamic-profile user-profile;
        interface ae1.0;
      }
    }
  }
}
```

Instead of using the aggregated Ethernet interface, you can alternatively specify **demux0** as the device to use with the subscriber interfaces as follows:

NOTE: Because the demux interfaces and unit values are created dynamically, the unit number is not specified for the demux0 interface.

```
system {
  services {
    dhcp-local-server {
      group myDhcpGroup {
        authentication {
          password test;
          username-include {
            user-prefix igmp-user1;
          }
        }
        dynamic-profile user-profile;
        interface demux0;
      }
    }
  }
}
```

Related Documentation

- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 404
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109

Example: Configuring IPv6 Dynamic VLAN Demux Interfaces Over an Aggregated Ethernet Underlying Interface with DHCP Local Server

This example shows how to configure the dynamic creation of IPv6 VLAN demux interfaces with aggregated Ethernet as the underlying interface. DHCP Local Server configuration enables the association of subscribers to the VLAN demux interface by listing the aggregated Ethernet interface in the DHCP local server configuration.

To configure dynamic subscribers on dynamic VLAN demux interfaces:

1. Enable VLAN tagging and VLAN auto-configuration on the underlying aggregated Ethernet interface that you plan to use for dynamically created VLAN demux interfaces.

```
interfaces {
  ae1 {
    vlan-tagging;
    auto-configure {
      vlan-ranges {
        dynamic-profile auto-vlanDemux-profile {
          accept inet6;
          ranges {
            any;
          }
        }
      }
    }
```

```
    aggregated-ether-options {
      minimum-links 1;
      lacp {
        active;
        periodic slow;
        link-protection {
          non-revertive;
        }
      }
    }
  }
}
```

2. Define the gigabit Ethernet interfaces that are part of the aggregated Ethernet interface.

```
interfaces {
  ge-5/0/0 {
    gigether-options {
      802.3ad ae1;
    }
  }
  ge-5/2/0 {
    gigether-options {
      802.3ad ae1;
    }
  }
}
```

3. Define the loopback interface.

```
interfaces {
  lo0 {
    unit 0 {
      family inet6 {
        address 2009:174:1:1::1/128;
      }
    }
  }
}
```

4. Configure a dynamic profile for subscriber access.

```
dynamic-profiles {
  user-profile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit" {
          family inet6;
        }
      }
    }
  }
}
```

5. Configure a dynamic profile for VLAN demux interface creation.

```
dynamic-profiles {
  auto-vlanDemux-profile {
    interfaces {
```

```
        demux0 {
          unit "$junos-interface-unit" {
            vlan-id "$junos-vlan-id";
            demux-options {
              underlying-interface "$junos-interface-ifd-name";
            }
            family inet6 {
              filter {
                input v6_rate_limit;
                output v6_rate_limit;
              }
              unnumbered-address lo0.0 preferred-source-address 2009:174:1:1::1;
            }
          }
        }
      }
    }
  }
```

6. Configure the access method used to dynamically create the subscriber interfaces. The following stanza specifies the aggregated Ethernet interface (**ae1.0**) for use with the dynamically-created subscriber interfaces.

```
system {
  services {
    dhcp-local-server {
      dhcpv6 {
        group myV6DhcpGroup {
          authentication {
            password test;
            username-include {
              user-prefix igmp-user1;
            }
          }
          dynamic-profile user-profile;
          interface ae1.0;
        }
      }
    }
  }
}
```

Instead of using the aggregated Ethernet interface, you can alternatively specify **demux0** as the device to use with the subscriber interfaces as follows:

NOTE: Because the demux interfaces and unit values are created dynamically, the unit number is not specified for the demux0 interface.

```
system {
  services {
    dhcp-local-server {
      dhcpv6 {
        group myV6DhcpGroup {
          authentication {
```

```
            password test;
            username-include {
              user-prefix igmp-user1;
            }
          }
          dynamic-profile user-profile;
          interface demux0;
        }
      }
    }
  }
}
```

Related Documentation

- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 404
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109

Example: Configuring IPv4 Dynamic Stacked VLAN Demux Interfaces Over an Aggregated Ethernet Underlying Interface with DHCP Local Server

This example shows how to configure the dynamic creation of IPv4 stacked VLAN demux interfaces with aggregated Ethernet as the underlying interface. DHCP Local Server configuration enables the association of subscribers to the VLAN demux interface by listing the aggregated Ethernet interface in the DHCP local server configuration.

To configure dynamic subscribers on dynamic VLAN demux interfaces:

1. Enable VLAN tagging and VLAN auto-configuration on the underlying aggregated Ethernet interface that you plan to use for dynamically created VLAN demux interfaces.

```
interfaces {
  ae1 {
    flexible-vlan-tagging;
    auto-configure {
      stacked-vlan-ranges {
        dynamic-profile auto-vlanDemux-profile {
          accept inet;
          ranges {
            any;
          }
        }
      }
    }
    aggregated-ether-options {
      minimum-links 1;
      lacp {
        active;
        periodic slow;
        link-protection {
          non-revertive;
        }
      }
    }
```

```
    }
  }
```

2. Define the gigabit Ethernet interfaces that are part of the aggregated Ethernet interface.

```
interfaces {
  ge-5/0/0 {
    gigether-options {
      802.3ad ae1;
    }
  }
  ge-5/2/0 {
    gigether-options {
      802.3ad ae1;
    }
  }
}
```

3. Define the loopback interface.

```
interfaces {
  lo0 {
    unit 0 {
      family inet {
        address 192.16.1.1/32;
      }
    }
  }
}
```

4. Configure a dynamic profile for subscriber access.

```
dynamic-profiles {
  user-profile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit" {
          family inet;
        }
      }
    }
  }
}
```

5. Configure a dynamic profile for VLAN demux interface creation.

```
dynamic-profiles {
  auto-vlanDemux-profile {
    interfaces {
      demux0 {
        unit "$junos-interface-unit" {
          vlan-tags outer "$junos-stacked-vlan-id" inner "$junos-vlan-id";
          demux-options {
            underlying-interface "$junos-interface-ifd-name";
          }
          family inet {
            filter {
              input rate_limit;
              output rate_limit;
```

```
            }
            unnumbered-address lo0.0 preferred-source-address 192.16.1.1;
          }
        }
      }
    }
  }
}
```

6. Configure the access method used to dynamically create the subscriber interfaces. The following stanza specifies the aggregated Ethernet interface (**ae1.0**) for use with the dynamically-created subscriber interfaces.

```
system {
  services {
    dhcp-local-server {
      group myDhcpGroup {
        authentication {
          password test;
          username-include {
            user-prefix igmp-user1;
          }
        }
        dynamic-profile user-profile;
        interface ae1.0;
      }
    }
  }
}
```

Instead of using the aggregated Ethernet interface, you can alternatively specify **demux0** as the device to use with the subscriber interfaces as follows:

NOTE: Because the demux interfaces and unit values are created dynamically, the unit number is not specified for the demux0 interface.

```
system {
  services {
    dhcp-local-server {
      group myDhcpGroup {
        authentication {
          password test;
          username-include {
            user-prefix igmp-user1;
          }
        }
        dynamic-profile user-profile;
        interface demux0;
      }
    }
  }
}
```

Related Documentation

- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 404
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109

CHAPTER 42

Dynamic PPPoE Subscriber Interfaces Overview

Subscriber Interfaces and PPPoE Overview

You can configure the router to dynamically create Point-to-Point Protocol over Ethernet (PPPoE) logical interfaces on statically created underlying Ethernet interfaces. The router automatically and transparently creates the dynamic interface in response to the receipt of a PPPoE Active Discovery Request (PADR) control packet on the underlying interface. Because the router creates a dynamic PPPoE logical interface on demand when a subscriber logs in to the network, dynamic PPPoE logical interfaces are also referred to as *dynamic PPPoE subscriber interfaces*.

To enable the router to create a dynamic PPPoE logical interface on an underlying Ethernet interface, you define the attributes of the PPPoE logical interface in a dynamic profile, and then attach the dynamic profile to an Ethernet interface configured with PPPoE encapsulation. When the router receives a PADR control packet from a PPPoE client on an underlying interface with a PPPoE dynamic profile attached, the router uses the attributes defined in the profile to instantiate a dynamic PPPoE subscriber interface to handle the PPPoE session.

This overview covers the following topics:

Benefits of Using Dynamic PPPoE Subscriber Interfaces

Configuring and using dynamic PPPoE subscriber interfaces offers the following benefits:

- On-demand dynamic interface creation

  Configuring dynamic PPPoE subscriber interfaces provides the flexibility of dynamically creating the PPPoE subscriber interface only when needed; that is, when a subscriber logs in on the associated underlying Ethernet interface. By contrast, statically created interfaces allocate and consume system resources when the interface is created. Configuring and using dynamically created interfaces helps you effectively and conveniently manage edge or access networks in which large numbers of subscribers are constantly logging in to and logging out from the network on a transient basis.

- Dynamic removal of PPPoE subscriber interfaces without manual intervention

  When the PPPoE subscriber logs out or the PPPoE session is terminated, the router dynamically deletes the associated PPPoE subscriber interface without your intervention, thereby restoring any consumed resources to the router.

- Use of dynamic profiles to efficiently manage multiple subscriber interfaces

  A *dynamic profile* is a set of characteristics that can be dynamically assigned to subscriber interfaces. By using a profile, you reduce the management of a large number of interfaces by applying a set of common characteristics to multiple interfaces. When you configure a dynamic profile for PPPoE, you use predefined dynamic variables in the profile to represent information that varies from subscriber to subscriber, such as the logical unit number and underlying interface name. These variables are dynamically replaced with the values supplied by the network when the subscriber logs in.

- Denial of service (DoS) protection

  You can optionally configure the underlying Ethernet interface with certain PPPoE-specific attributes that can reduce the potential for DoS attacks. Duplicate protection, which is disabled by default, prevents activation of another dynamic PPPoE logical interface on the underlying interface when a PPPoE logical interface for the same client is already active on the underlying interface. You can also specify the maximum number of PPPoE sessions that the router can activate on the underlying interface. By enabling duplicate protection and restricting the maximum number of PPPoE sessions on the underlying interface, you can ensure that a single toxic PPPoE client cannot monopolize allocation of the PPPoE session.

- Support for dynamic PPPoE subscriber interface creation from PPPoE service name tables

  You can assign a previously configured PPPoE dynamic profile to a named, **empty**, or **any** service entry in a PPPoE service name table, or to an agent circuit identifier/agent remote identifier (ACI/ARI) pair defined for these services. The router uses the attributes defined in the profile to instantiate a dynamic PPPoE subscriber interface based on the service name, ACI, and ARI information provided by the PPPoE client during PPPoE negotiation. To specify the routing instance in which to instantiate the dynamic PPPoE subscriber interface, you can assign a previously configured routing instance to a named, **empty**, or **any** service, or to an ACI/ARI pair defined for these services. The dynamic profile and routing instance configured for the PPPoE service name table overrides the

dynamic profile and routing instance assigned to the PPPoE underlying interface on which the dynamic subscriber interface is created.

Supported Platforms for Dynamic PPPoE Subscriber Interfaces

Configuration of dynamic PPPoE subscriber interfaces over static underlying Ethernet interfaces is supported on the following routing platforms:

- Intelligent Queuing 2 (IQ2) PICs on M120 Multiservice Edge Router and M320 Multiservice Edge Router
- Trio MPC/MIC interfaces on MX Series Ethernet Service Routers

Sequence of Operations for PPPoE Subscriber Access

When a PPPoE subscriber logs in to the network, the PPPoE protocol defines the sequence of operations by which a connection is established and traffic flow is enabled on the dynamic PPPoE subscriber interface. Similarly, when the PPPoE subscriber logs out from the network, PPPoE defines the sequence that occurs to terminate the connection and remove the dynamic PPPoE subscriber interface from the router.

The router creates a dynamic PPPoE subscriber interface for each new PPPoE session, and removes the dynamic PPPoE subscriber interface when the session is terminated due to subscriber logout, PPP negotiation failure, or down status of the underlying Ethernet interface. Dynamic PPPoE subscriber interfaces are never reused for multiple PPPoE sessions.

Sequence When a PPPoE Subscriber Logs In

In a PPPoE subscriber network, the router acts as a *remote access concentrator*, also known as a *PPPoE server*. For a PPPoE client to initiate a PPPoE session with a PPPoE server, it must first perform PPPoE Discovery to identify the Ethernet MAC address of the remote access concentrator that can service its request. Based on the network topology, there may be more than one remote access concentrator with which the client can communicate. The Discovery process enables a PPPoE client to find all remote access concentrators and then select one to connect to.

The following sequence occurs when a PPPoE subscriber logs in to the network. Steps 1 through 5 in this sequence are part of the PPPoE Discovery process.

1. The PPPoE client broadcasts a PPPoE Active Discovery Initiation (PADI) packet to all remote access concentrators in the network.
2. One or more remote access concentrators respond to the PADI packet by sending a PPPoE Active Discovery Offer (PADO) packet, indicating that they can service the client request. The PADO packet includes the name of the access concentrator from which it was sent.
3. The client sends a unicast PPPoE Active Discovery Request (PADR) packet to the access concentrator it selects.

4. On receipt of the PADR packet on the underlying interface associated with a PPPoE dynamic profile, the router uses the attributes configured in the dynamic profile to create the dynamic PPPoE logical interface.
5. The router sends a PPPoE Active Discovery Session (PADS) packet to confirm establishment of the PPPoE connection.
6. The PPP Link Control Protocol (LCP) negotiates the PPP link between the client and the PPPoE server.
7. The subscriber is authenticated using the PPP authentication protocol (CHAP or PAP) configured in the PPPoE dynamic profile.
8. The PPP Network Control Protocol (NCP) negotiates the IP routing protocol and network family.
9. The PPP server issues an IP access address for the client, and the router adds the client access route to its routing table.
10. The router instantiates the dynamic profile and applies the attributes configured in the profile to the dynamic PPPoE subscriber interface.
11. PPP NCP negotiation completes, enabling traffic flow between the PPPoE client and the PPPoE server.

Sequence When a PPPoE Subscriber Logs Out

The following sequence occurs when a PPPoE subscriber logs out of the network:

1. The client terminates the PPP connection and the router receives an LCP termination request.
2. The router removes the client access router from its routing table.
3. The router sends or receives a PPPoE Active Discovery Termination (PADT) packet to end the PPPoE connection.
4. The router deactivates the subscriber, gathers final statistics for the PPPoE session, and sends the RADIUS server an Acct-Stop accounting message.
5. The router de-instantiates the PPPoE dynamic profile and removes the PPPoE logical interface. The router does not reuse the PPPoE logical interface for future dynamic PPPoE sessions.

Related Documentation

- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 463
- Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles on page 467
- For information about configuring static PPPoE interfaces and PPPoE service name tables, see the *Junos OS Network Interfaces Configuration Guide*

Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview

Creating a dynamic PPPoE subscriber interface over a static underlying Ethernet interface consists of two basic steps:

1. Configure a dynamic profile to define the attributes of the PPPoE logical interface.
2. Attach the dynamic profile to a statically created underlying Ethernet interface configured with PPPoE encapsulation.

This overview describes the concepts you need to understand to configure a dynamic PPPoE subscriber interface, and covers the following topics:

PPPoE Dynamic Profile Configuration

A *dynamic profile* is a template for configuring a dynamic interface. You use predefined dynamic variables in the PPPoE dynamic profile to represent information that varies from subscriber to subscriber, such as the logical unit number and underlying interface name. These variables are dynamically replaced with the values supplied by the network when the subscriber logs in. On receipt of traffic on an underlying Ethernet interface to which a dynamic profile is attached, the router creates the dynamic PPPoE logical interface, also referred to as a *dynamic PPPoE subscriber interface*, on the underlying interface and applies the properties configured in the dynamic profile.

To provide basic access for PPPoE subscribers, the dynamic profile must provide a minimal configuration for a **pp0** (PPPoE) logical interface that includes at least the following attributes:

- The logical unit number, represented by the **$junos-interface-unit** predefined dynamic variable
- The name of the underlying Ethernet interface, represented by the **$junos-underlying-interface** predefined dynamic variable
- Configuration of the router to act as a PPPoE server
- The PPP authentication protocol (PAP or CHAP)
- The unnumbered address for the **inet** (IPv4) family

You can also optionally configure additional options for PPPoE subscriber access in the dynamic profile, including:

- The keepalive interval, or the option to disable sending keepalive messages
- The IPv4 address of the dynamic PPPoE logical interface

- The service sets and filters, input filters, and output filters to be applied to the dynamic PPPoE logical interface

PPPoE Underlying Interface Configuration

After you configure a dynamic profile to define the attributes of a dynamic PPPoE subscriber interface, you must attach the dynamic profile to the underlying Ethernet interface on which you want the router to dynamically create the PPPoE logical interface. The underlying interface for a dynamic PPPoE logical interface must be statically created and configured with PPPoE (**ppp-over-ether**) encapsulation. When a PPPoE subscriber logs in on the underlying interface, the router dynamically creates the PPPoE logical interface and applies the attributes defined in the profile to the interface.

In addition to attaching the dynamic profile to the interface, you can also configure the underlying interface with one or more of the following optional PPPoE-specific attributes:

- Prevention of another dynamic PPPoE logical interface from being activated on the underlying interface when a PPPoE logical interface for a client with the same MAC address is already active on that interface
- Maximum number of dynamic PPPoE logical interfaces (sessions) that the router can activate on the underlying interface
- An alternative access concentrator name in the AC-NAME tag in a PPPoE control packet

Address Assignment for Dynamic PPPoE Subscriber Interfaces

If the subscriber address for a dynamic PPPoE interface is not specified by means of the Framed-IP-Address (8) or Framed-Pool (88) RADIUS IETF attributes during authentication, the router allocates an IP address from the first IPv4 local address-assignment pool defined in the routing instance. For this reason, make sure that the local address assigned for the **inet** (IPv4) address family is in the same subnet as the addresses obtained from the first IPv4 local address-assignment pool.

The router allocates the IP address from the first IPv4 local address-assignment pool under either of the following conditions:

- RADIUS returns no address attributes.
- RADIUS authentication does not take place because only address allocation is requested.

If the first IPv4 local address-assignment pool has no available addresses, or if no IPv4 local address-assignment pools are configured, the router does not allocate an IP address to the dynamic PPPoE subscriber interface, and denies access to the associated subscriber. To avoid depletion of IP addresses, you can configure linked address-assignment pools on the first IPv4 local address-assignment pool to create one or more backup pools.

For more information, see “Configuring Address-Assignment Pools” on page 56.

Guidelines for Configuring Dynamic PPPoE Subscriber Interfaces

Observe the following guidelines when you configure dynamic PPPoE subscriber interfaces:

- You can configure dynamic PPPoE subscriber interfaces only for the **inet** (IPv4) protocol family in the current release.
- When you configure the **pp0** (PPPoE) logical interface in a PPPoE dynamic profile, you must include the **pppoe-options** subhierarchy at the **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit"]** hierarchy level. At a minimum, the **pppoe-options** subhierarchy must include the name of the underlying Ethernet interface, represented by the **$junos-underlying-interface** predefined dynamic variable, and the **server** statement, which configures the router to act as a PPPoE server. If you omit the **pppoe-options** subhierarchy from the configuration, the **commit** operation fails.
- When you configure CHAP or PAP authentication in a PPPoE dynamic profile, you cannot configure additional options for the **chap** or **pap** statements. This is because the router supports only unidirectional authentication for dynamic interfaces; that is, the router always functions as the authenticator.
- When you attach the PPPoE dynamic profile to an underlying Ethernet interface, ensure that both of the following conditions are met:
  - The PPPoE dynamic profile has already been configured on the router.
  - The underlying Ethernet interface has already been statically configured on the router with PPPoE (**ppp-over-ether**) encapsulation.
- You cannot attach a PPPoE dynamic profile to an underlying Ethernet interface that is already associated with static PPPoE logical interfaces. Conversely, you cannot associate static PPPoE logical interfaces with an underlying Ethernet interface that already has a PPPoE dynamic profile attached.

Related Documentation

- Subscriber Interfaces and PPPoE Overview on page 459
- Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles on page 467
- Example: Configuring a Dynamic PPPoE Subscriber Interface on a Static Gigabit Ethernet VLAN Interface on page 479
- For more information about static PPPoE interfaces, see the *Junos OS Network Interfaces Configuration Guide*

CHAPTER 43

Configuring Dynamic PPPoE Subscriber Interfaces

Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles

You can configure dynamic PPP-over-Ethernet (PPPoE) subscriber interfaces by using dynamic profiles. To enable the router to create a dynamic PPPoE subscriber interface on a PPPoE underlying interface, you define the attributes of the PPPoE logical interface in a dynamic profile, and then configure the underlying interface to use the dynamic profile.

To configure a dynamic PPPoE subscriber interface:

1. Configure a dynamic profile to define the attributes of the PPPoE logical interface.
   - To configure a basic dynamic profile for PPPoE subscriber access, see “Configuring a Basic PPPoE Dynamic Profile” on page 468.
   - To configure a dynamic profile for PPPoE with additional options for subscriber access, see “Configuring a PPPoE Dynamic Profile with Additional Options” on page 471.
2. Configure the underlying Ethernet interface to use the dynamic profile for PPPoE.

   See “Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces” on page 473.
3. (Optional) Assign a dynamic profile and routing instance to a service name or ACI/ARI pair in a PPPoE service name table to instantiate a dynamic PPPoE subscriber interface based on the information provided by the PPPoE client.

See “Assigning a Dynamic Profile and Routing Instance to a Service Name or ACI/ARI Pair for Dynamic PPPoE Interface Creation” on page 475.

4. (Optional) Verify the dynamic PPPoE configuration by displaying or clearing PPPoE session statistics, and displaying information about the underlying Ethernet interface and PPPoE logical interface.

   See “Verifying and Managing Dynamic PPPoE Configuration” on page 476.

Related Documentation

- Subscriber Interfaces and PPPoE Overview on page 459
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 463
- Example: Configuring a Dynamic PPPoE Subscriber Interface on a Static Gigabit Ethernet VLAN Interface on page 479
- Example: Configuring a PPPoE Service Name Table for Dynamic Subscriber Interface Creation on page 481

Configuring a Basic PPPoE Dynamic Profile

You can configure a basic dynamic profile for PPPoE subscribers that access the network. The dynamic profile defines the attributes of the dynamic PPPoE logical interface, also referred to as a *dynamic PPPoE subscriber interface*.

To provide basic access for PPPoE subscribers, the dynamic profile must provide a minimal configuration for a **pp0** (PPPoE) logical interface that includes the following:

- The logical unit number, represented by the **$junos-interface-unit** predefined dynamic variable
- The name of the underlying Ethernet interface, represented by the **$junos-underlying-interface** predefined dynamic variable
- The **server** statement, which configures the router to act as a PPPoE server
- The PPP authentication protocol (PAP or CHAP)
- The unnumbered address for the **inet** (IPv4) family

To configure a basic PPPoE dynamic profile:

1. Name the dynamic profile.

   ```
   [edit]
   user@host# edit dynamic-profiles basic-pppoe-profile
   ```

2. Specify that you want to configure the **pp0** logical interface in the dynamic profile.

   ```
   [edit dynamic-profiles basic-pppoe-profile]
   user@host# edit interfaces pp0
   ```

3. Configure the predefined variable to represent the logical unit number for the **pp0** interface.

You must use the **$junos-interface-unit** variable instead of the logical unit number for the **unit** statement. The **$junos-interface-unit** variable is dynamically replaced with the actual unit number supplied by the network when the subscriber logs in.

```
[edit dynamic-profiles basic-pppoe-profile interfaces pp0]
user@host# edit unit $junos-interface-unit
```

4. Configure PPPoE-specific options for the **pp0** interface.

   a. Configure the predefined variable to represent the name of the underlying Ethernet interface on which the router creates the dynamic PPPoE logical interface.

      You must use the **$junos-underlying-interface** variable instead of the underlying interface name for the **underlying-interface** statement. The **$junos-underlying-interface** variable is dynamically replaced with the actual name of the underlying interface supplied by the network when the subscriber logs in.

      ```
      [edit dynamic-profiles basic-pppoe-profile interfaces pp0 unit
        "$junos-interface-unit"]
      user@host# set pppoe-options underlying-interface $junos-underlying-interface
      ```

   b. Configure the router to act as a PPPoE server, also known as a remote access concentrator.

      ```
      [edit dynamic-profiles basic-pppoe-profile interfaces pp0 unit
        "$junos-interface-unit"]
      user@host# set pppoe-options server
      ```

5. Configure the PPP authentication protocol for the **pp0** interface.

   For dynamic interfaces, the router supports only unidirectional authentication; that is, the router always functions as the authenticator. When you configure PPP authentication in a dynamic profile, the **chap** and **pap** statements do not support any additional configuration options.

   - To configure CHAP authentication:

     ```
     [edit dynamic-profiles basic-pppoe-profile interfaces pp0 unit "$junos-interface-unit"]
     user@host# set ppp-options chap
     ```

   - To configure PAP authentication:

     ```
     [edit dynamic-profiles basic-pppoe-profile interfaces pp0 unit "$junos-interface-unit"]
     user@host# set ppp-options pap
     ```

6. Configure the family for the **pp0** interface.

   a. Specify that you want to configure the **inet** (IPv4) family.

      NOTE: The creation of dynamic PPPoE subscriber interfaces is currently supported only for the inet family.

      ```
      [edit dynamic-profiles basic-pppoe-profile interfaces pp0 unit
        "$junos-interface-unit"]
      user@host# edit family inet
      ```

   b. Configure the unnumbered address for the family.

```
[edit dynamic-profiles basic-pppoe-profile interfaces pp0 unit "$junos-interface-unit"
   family inet]
user@host# set unnumbered-address lo0.0
```

Related Documentation

- Subscriber Interfaces and PPPoE Overview on page 459
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 463
- Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces on page 473
- Example: Configuring a Dynamic PPPoE Subscriber Interface on a Static Gigabit Ethernet VLAN Interface on page 479
- Verifying and Managing Dynamic PPPoE Configuration on page 476

Configuring a PPPoE Dynamic Profile with Additional Options

You can configure a dynamic profile for PPPoE that has additional options for subscriber access. All of these optional statements, with the exception of the **keepalives** and **no-keepalives** statements, are configured at the **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family inet]** hierarchy level. The **keepalives** and **no-keepalives** statements are configured at the **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit"]** hierarchy level.

The additional options for PPPoE subscriber access in a dynamic profile can include one or more of the following:

- The keepalive interval (**keepalives**), or the option to disable sending keepalive messages (**no-keepalives**)
- The IPv4 address of the dynamic PPPoE logical interface (**address**)
- Definition of the service sets and filters to be applied to the dynamic PPPoE logical interface, configured at the **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family inet service]** hierarchy level
- Association of an input and output filter to the dynamic PPPoE logical interface, configured at the **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family inet filter]** hierarchy level

Before you begin:

- Configure a basic PPPoE dynamic profile.

  See "Configuring a Basic PPPoE Dynamic Profile" on page 468.

To configure a PPPoE dynamic profile with additional options for subscriber access:

1. Modify the keepalive interval, or configure the router to disable sending keepalive messages.
   - To modify the keepalive interval:

     ```
     [edit dynamic-profiles business-pppoe-profile interfaces pp0 unit
       "$junos-interface-unit"]
     user@host# set keepalives interval 15
     ```

   - To disable sending keepalive messages:

     ```
     [edit dynamic-profiles business-pppoe-profile interfaces pp0 unit
       "$junos-interface-unit"]
     user@host# set no-keepalives
     ```

2. Specify that you want to configure the **inet** (IPv4) family.

NOTE: The creation of dynamic PPPoE subscriber interfaces is currently supported only for the inet family.

```
[edit dynamic-profiles business-pppoe-profile interfaces pp0 unit
  "$junos-interface-unit"]
user@host# edit family inet
```

3. Specify the IPv4 address of the dynamic PPPoE logical interface.

```
[edit dynamic-profiles business-pppoe-profile interfaces pp0 unit
  "$junos-interface-unit" family inet]
user@host# set address 6.6.6.7/32
```

4. Specify the input and output service sets that you want to apply to the dynamic PPPoE logical interface.

```
[edit dynamic-profiles business-pppoe-profile interfaces pp0 unit
  "$junos-interface-unit" family inet]
user@host# set service input service-set inputService_100
user@host# set service input post-service-filter postService_20
user@host# set service output service-set outputService_200
```

5. Specify the input and output filters that you want to apply to the dynamic PPPoE logical interface.

   To control the order in which filters are processed, you can optionally specify a precedence value for the input filter, output filter, or both.

```
[edit dynamic-profiles business-pppoe-profile interfaces pp0 unit
  "$junos-interface-unit" family inet]
user@host# set filter input pppoe-input-filter
user@host# set filter output pppoe-output-filter precedence 50
```

Related Documentation

- Subscriber Interfaces and PPPoE Overview on page 459
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 463
- Configuring a Basic PPPoE Dynamic Profile on page 468
- Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces on page 473
- Example: Configuring a Dynamic PPPoE Subscriber Interface on a Static Gigabit Ethernet VLAN Interface on page 479
- Verifying and Managing Dynamic PPPoE Configuration on page 476
- Dynamic Service Sets Overview on page 501
- Associating Service Sets to Interfaces in a Dynamic Profile on page 527
- Dynamic Firewall Filters Overview on page 487
- Dynamically Attaching Statically Created Filters for a Specific Interface Family Type on page 503

Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces

After you configure a dynamic profile to define the attributes of a dynamic PPPoE subscriber interface, you must attach the dynamic profile to a statically created underlying Ethernet interface configured with PPPoE (**ppp-over-ether**) encapsulation. You configure the underlying interface at the **[edit interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]** hierarchy level.

In addition to attaching the dynamic profile to the interface by using the required **dynamic-profile** statement, you can also configure the underlying interface with one or more of the following optional PPPoE-specific attributes:

- Prevention of another dynamic PPPoE logical interface from being activated on the underlying interface when a PPPoE logical interface for a client with the same MAC address is already active on that interface (**duplicate-protection**)
- Maximum number of dynamic PPPoE logical interfaces (sessions) that the router can activate on the underlying interface (**max-sessions**)
- An alternative access concentrator name in the AC-NAME tag in a PPPoE control packet (**access-concentrator**)

Before you begin:

1. Configure the static underlying Ethernet interface on which you want the router to dynamically create the PPPoE logical interface.

   For information about configuring static Ethernet interfaces, see the *Junos OS Network Interfaces Configuration Guide*.

2. Configure a PPPoE dynamic profile in either of the following ways:

   - To configure a basic PPPoE dynamic profile, see “Configuring a Basic PPPoE Dynamic Profile” on page 468.
   - To configure a PPPoE dynamic profile with additional options for subscriber access, see “Configuring a PPPoE Dynamic Profile with Additional Options” on page 471.

To configure an underlying Ethernet interface for a dynamic PPPoE subscriber interface:

1. Specify the name and logical unit number of the static underlying Ethernet interface to which you want to attach the PPPoE dynamic profile.

   ```
   [edit]
   user@host# edit interfaces ge-1/0/1 unit 0
   ```

2. Configure PPPoE encapsulation on the underlying interface.

   ```
   [edit interfaces ge-1/0/1 unit 0]
   user@host# set encapsulation ppp-over-ether
   ```

3. Specify that you want to configure PPPoE-specific options on the underlying interface.

   ```
   [edit interfaces ge-1/0/1 unit 0]
   user@host# edit pppoe-underlying-options
   ```

4. Attach a previously configured PPPoE dynamic profile to the underlying interface.

   The specified PPPoE dynamic profile must already be configured on the router. In addition, you cannot attach a PPPoE dynamic profile to an underlying Ethernet interface that is already associated with static PPPoE logical interfaces. Conversely, you cannot associate static PPPoE logical interfaces with an underlying Ethernet interface that already has a PPPoE dynamic profile attached.

   ```
   [edit interfaces ge-1/0/1 unit 0 pppoe-underlying-options]
   user@host# set dynamic-profile basic-pppoe-profile
   ```

5. (Optional) Enable duplicate protection to prevent activation of another dynamic PPPoE logical interface for the same client on the underlying interface.

   ```
   [edit interfaces ge-1/0/1 unit 0 pppoe-underlying-options]
   user@host# set duplicate-protection
   ```

6. (Optional) Specify the maximum number of dynamic PPPoE sessions that the router can activate on the underlying interface, from 1 to the maximum number of PPPoE sessions supported on your routing platform.

   ```
   [edit interfaces ge-1/0/1 unit 0 pppoe-underlying-options]
   user@host# set max-sessions 20
   ```

7. (Optional) Specify the alternative name for the access concentrator, also known as the PPPoE server.

   ```
   [edit interfaces ge-1/0/1 unit 0 pppoe-underlying-options]
   user@host# set access-concentrator server-east
   ```

Related Documentation

- Subscriber Interfaces and PPPoE Overview on page 459
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 463
- Configuring a Basic PPPoE Dynamic Profile on page 468
- Configuring a PPPoE Dynamic Profile with Additional Options on page 471
- Example: Configuring a Dynamic PPPoE Subscriber Interface on a Static Gigabit Ethernet VLAN Interface on page 479
- Verifying and Managing Dynamic PPPoE Configuration on page 476
- For information about configuring static Ethernet underlying interfaces, see the *Junos OS Network Interfaces Configuration Guide*

Assigning a Dynamic Profile and Routing Instance to a Service Name or ACI/ARI Pair for Dynamic PPPoE Interface Creation

You can create a dynamic PPPoE subscriber interface based on the service name, agent circuit identifier (ACI), and agent remote identifier (ARI) information provided by the PPPoE client during PPPoE negotiation. To do so, you assign a previously configured PPPoE dynamic profile to a named service, **empty** service, or **any** service entry in a PPPoE service name table, or to an ACI/ARI pair defined for these services.

Similarly, to specify the routing instance in which to instantiate the dynamic PPPoE subscriber interface, you can assign a previously configured routing instance to a named service, **empty** service, or **any** service in a PPPoE service name table, or to an ACI/ARI pair defined for these services.

Observe the following configuration guidelines when you assign a dynamic profile and routing instance to a PPPoE service name table to create a dynamic PPPoE subscriber interface:

- The dynamic profile and routing instance must already be configured on the router.
- The dynamic profile or routing instance assigned to the PPPoE service name table overrides the dynamic profile or routing instance assigned to the PPPoE underlying interface on which the dynamic subscriber interface is created.
- You cannot configure a dynamic profile or routing instance for an ACI/ARI pair already configured with a static interface (by using the **static-interface** statement). Conversely, you cannot configure a static interface for an ACI/ARI pair already configured with a dynamic profile or routing instance.

Before you begin:

1. Configure a PPPoE dynamic profile in either of the following ways:
   - To configure a basic PPPoE dynamic profile, see “Configuring a Basic PPPoE Dynamic Profile” on page 468.
   - To configure a PPPoE dynamic profile with additional options for subscriber access, see “Configuring a PPPoE Dynamic Profile with Additional Options” on page 471.
2. Configure the routing instance in which you want the router to instantiate the dynamic profile.

   For information about configuring routing instances, see the *Junos OS Routing Protocols Configuration Guide*.
3. Create the PPPoE service name table on the router.

   See Creating a Service Name Table in the *Junos OS Network Interfaces Configuration Guide*.

To create a dynamic PPPoE subscriber interface based on the service name and, optionally, associated ACI/ARI pair configured in a PPPoE service name table, do one of the following:

- Assign a previously configured dynamic profile and routing instance to a named, **empty**, or **any** service.

  ```
  [edit protocols pppoe service-name-tables table1]
  user@host# set service premium dynamic-profile premiumProfile routing-instance
    premiumRI
  ```

- Assign a previously configured dynamic profile and routing instance to the ACI/ARI pair defined for a named, **empty**, or **any** service.

  ```
  [edit protocols pppoe service-name-tables table1]
  user@host# set service any agent-specifier aci west-ge-3/0/3 ari sunnyvale
    dynamic-profile standardProfile routing-instance standardRI
  ```

Related Documentation

- Example: Configuring a PPPoE Service Name Table for Dynamic Subscriber Interface Creation on page 481
- Subscriber Interfaces and PPPoE Overview on page 459
- Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles on page 467
- Configuring PPPoE Service Name Tables

Verifying and Managing Dynamic PPPoE Configuration

Purpose View or clear information about dynamic PPPoE logical interfaces, underlying interfaces for dynamic PPPoE logical interfaces, and PPPoE statistics

Action

- To display information about the properties of all PPPoE underlying interfaces associated with a dynamic PPPoE profile:

  ```
  user@host> show pppoe underlying-interfaces
  ```

- To display information about the PPPoE properties of a specified underlying interface associated with a dynamic PPPoE profile:

  ```
  user@host> show pppoe underlying-interfaces interface-name
  ```

- To display session-specific information about PPPoE interfaces, including whether the interface was dynamically created or statically created:

  ```
  user@host> show pppoe interfaces
  ```

- To display information for a specified PPPoE service name table, including the assigned dynamic profile and routing instance, if configured:

  ```
  user@ host> show pppoe service-name-tables table-name
  ```

- To display information about all active PPPoE sessions on the router:

  ```
  user@host > show pppoe sessions
  ```

- To display information for all active PPPoE sessions established for a specified service name:

user@host > **show pppoe sessions service** ***service-name***

- To display information for all active PPPoE sessions established for a specified agent circuit identifier (ACI) or agent remote identifier (ARI) string:

  user@host > **show pppoe sessions aci "west-ge-2/0/3"**
  user@host > **show pppoe sessions ari "sunnyvale"**

- To display PPPoE control packet statistics for all PPPoE sessions:

  user@host> **show pppoe statistics**

- To display PPPoE control packet statistics for a specified PPPoE underlying interface:

  user@host> **show pppoe statistics** ***interface-name***

- To clear (reset) PPPoE control packet statistics for all PPPoE sessions:

  user@host> **clear pppoe statistics**

- To clear (reset) PPPoE control packet statistics for a specified underlying Ethernet interface:

  user@host> **clear pppoe statistics** ***interface-name***

Related Documentation

- For more information, see the *Junos OS Interfaces Command Reference*

CHAPTER 44

Dynamic PPPoE Subscriber Interfaces Examples

Example: Configuring a Dynamic PPPoE Subscriber Interface on a Static Gigabit Ethernet VLAN Interface

This example shows how to configure a dynamic PPPoE subscriber interface on a statically configured Gigabit Ethernet VLAN underlying interface. When a PPPoE subscriber logs in on the underlying interface, the router creates the dynamic PPPoE subscriber interface with the attributes specified in the dynamic profile.

In this example, the dynamic PPPoE profile, **pppoe-profile-east**, defines options for PPPoE subscribers accessing the network, and includes the predefined dynamic variables **$junos-interface-unit**, which represents the logical unit number of the dynamic PPPoE logical interface, and **$junos-underlying-interface**, which represents the name of the underlying Ethernet interface. The **pppoe-profile-east** dynamic profile is assigned to the underlying Ethernet VLAN interface **ge-2/0/3.1** that is configured with PPPoE (**ppp-over-ether**) encapsulation.

When the router dynamically creates the PPPoE subscriber interface on **ge-2/0/3.1** in response to a subscriber login, the values of **$junos-interface-unit** and **$junos-underlying-interface** are dynamically replaced with the actual logical unit number and interface name, respectively, that are supplied by the network when the PPPoE subscriber logs in.

To configure a dynamic PPPoE subscriber interface:

1. Configure a dynamic profile to define the attributes of the dynamic PPPoE subscriber interface.

```
[edit]
dynamic-profiles {
```

```
pppoe-profile-east {
  interfaces {
    pp0 {
      unit "$junos-interface-unit" {
        ppp-options {
          chap;
        }
        pppoe-options {
          underlying-interface "$junos-underlying-interface";
          server;
        }
        keepalives interval 30;
        family inet {
          filter {
            input pppoe-input-filter-east;
            output pppoe-output-filter-east precedence 20;
          }
          service {
            input {
              service-set inputService-east;
              post-service-filter postService-east;
            }
            output {
              service-set outputService-east;
            }
          }
          address 6.6.6.1/32;
          unnumbered-address lo0.0;
        }
      }
    }
  }
}
```

2. Assign the dynamic PPPoE profile to the static underlying Ethernet interface, and define PPPoE-specific attributes for the underlying interface.

```
[edit]
interfaces {
  ge-2/0/3 {
    vlan-tagging;
    unit 1 {
      encapsulation ppp-over-ether;
      vlan-id 100;
      pppoe-underlying-options {
        access-concentrator server-east;
        duplicate-protection;
        dynamic-profile pppoe-profile-east;
        max-sessions 10;
      }
    }
  }
}
```

Related Documentation

- Subscriber Interfaces and PPPoE Overview on page 459
- Dynamic PPPoE Subscriber Interfaces over Static Underlying Interfaces Overview on page 463
- Configuring a PPPoE Dynamic Profile with Additional Options on page 471
- Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces on page 473

Example: Configuring a PPPoE Service Name Table for Dynamic Subscriber Interface Creation

This example shows how to configure a PPPoE service name table to create a dynamic PPPoE subscriber interface based on the service name, agent circuit identifier (ACI), and agent remote identifier (ARI) information provided by PPPoE clients during PPPoE negotiation.

In this example, PPPoE service name table **TableDynamicPPPoE** includes an **any** service entry, **empty** service entry, and two named service entries: **Premium** and **Standard**. The PPPoE underlying interfaces configured for **TableDynamicPPPoE** are **ge-2/0/0.1** and **ge-2/0/0.2**. Only **ge-2/0/0.1** is configured for dynamic profile assignment and creation of dynamic PPPoE subscriber interfaces.

Following the configuration example, Table 45 on page 483 explains how the router evaluates the entries in **TableDynamicPPPoE** to create a dynamic PPPoE subscriber interface in a specified routing instance for each of several sample clients.

To configure a PPPoE service name table to create dynamic PPPoE subscriber interfaces:

1. Configure the PPPoE service name table.

```
protocols {
  pppoe {
    service-name-tables TableDynamicPPPoE {
      service any {
        terminate;
        max-sessions 100;
        dynamic-profile AnyProfile;
        agent-specifier {
          aci "broadway-ge-1/0/1.0" ari "london" {
            terminate;
            dynamic-profile LondonProfile;
            routing-instance LondonRI;
          }
          aci "groton-ge-4/0/3.32" ari "paris" {
            delay 5;
            dynamic-profile ParisProfile;
            routing-instance ParisRI;
          }
        }
      }
      service empty {
        drop;
```

```
            agent-specifier {
              aci "dunstable-ge-1/0/0.1" ari "kanata" {
                dynamic-profile BasicPppoeProfile;
                delay 10;
              }
            }
          }
          service Premium {
            terminate;
            dynamic-profile PremiumProfile;
          }
          service Standard {
            terminate;
            max-sessions 10;
            dynamic-profile StandardProfile;
            agent-specifier {
              aci "dunstable-ge-1/0/0.1" ari "kanata" {
                dynamic-profile BasicPppoeProfile;
                delay 10;
              }
            }
          }
        }
      }
    }
```

2. Configure the PPPoE underlying interface for the service name table.

```
interfaces {
  ge-2/0/0 {
    vlan-tagging;
    unit 1 {
      vlan-id 1;
      pppoe-underlying-options {
        dynamic-profile BasicPppoeProfile;
        service-name-table TableDynamicPPPoE;
      }
    }
    unit 2 {
      vlan-id 2;
      pppoe-underlying-options {
        service-name-table TableDynamicPPPoE;
      }
    }
  }
}
```

Table 45 on page 483 lists the service name, ACI value, and ARI value provided in several sample PPPoE client requests, and the name of the PPPoE underlying interface on which the router received each client request. The Results column describes the dynamic PPPoE subscriber interface created by the router based on *both* of the following:

- The values received from each PPPoE client during PPPoE negotiation
- The sequence in which the router evaluates the entries configured in the PPPoE service name table to find a match for the client's service name and ACI/ARI information, as

described in "Evaluation Order for Matching Client Information in PPPoE Service Name Tables" on page 484

Table 45: Dynamic PPPoE Subscriber Interface Creation Based on PPPoE Client Request Values

PPPoE Client	Service Name	ACI Value	ARI Value	Receiving Underlying Interface	Results
Client 1	Premium	broadway-ge-1/0/1.1	london	ge-2/0/0.1	Matches ACI/ARI pair configured for **any** service. Router creates dynamic PPPoE subscriber interface over **ge-2/0/0.1** using **LondonProfile** dynamic profile and **LondonRI** routing instance assigned to **any** service.
Client 2	Premium	dunstable-ge-1/0/1.0	toronto	ge-2/0/0.1	Matches base **Premium** service. Router creates dynamic PPPoE subscriber interface over **ge-2/0/0.1** using **PremiumProfile** dynamic profile and routing instance associated with **ge-2/0/0.1** underlying interface.
Client 3	empty	dunstable-ge-1/0/0.1	kanata	ge-2/0/0.1	Matches ACI/ARI pair configured for **empty** service and **Standard** service. Router creates dynamic PPPoE subscriber interface over **ge-2/0/0.1** after a delay of 10 seconds if no other PPPoE server responds to the client request within that time. Router uses **BasicPPPoEProfile** dynamic profile and routing instance associated with **ge-2/0/0.1** underlying interface.
Client 4	empty	slinger-ge-1/0/0.1	chicago	ge-2/0/0.2	Because receiving underlying interface **ge-2/0/0.2** is *not* associated with a dynamic profile, router does not create a dynamic PPPoE subscriber interface, and drops any PADI or PADR control packets received from this client.
Client 5	Standard	slinger-ge-1/0/0.1	chicago	ge-2/0/0.1	Matches base **Standard** service. Router creates dynamic PPPoE subscriber interface over **ge-2/0/0.1** using **StandardProfile** dynamic profile and routing instance associated with **ge-2/0/0.1** underlying interface.

Related Documentation

- Evaluation Order for Matching Client Information in PPPoE Service Name Tables on page 484
- Subscriber Interfaces and PPPoE Overview on page 459

- Understanding PPPoE Service Name Tables
- Configuring PPPoE Service Name Tables

Evaluation Order for Matching Client Information in PPPoE Service Name Tables

When the router receives a service request from a PPPoE client, it evaluates the entries configured in the PPPoE service name table to find a match for the client's ACI/ARI information so it can take the appropriate action.

The order of evaluation is as follows:

1. The router evaluates the ACI/ARI information configured for the **any** service entry, and ignores the contents of the service name tag transmitted by the client.
2. If no match is found for the client information, the router evaluates the ACI/ARI information for the **empty** service entry and the named service entries. If an ACI/ARI pair is not configured for these service entries, the router evaluates the other attributes configured for the **empty** service and named services.
3. If there is still no match for the client information, the router evaluates the other attributes configured for the **any** service entry, and ignores both the ACI/ARI information for the **any** service and the contents of the service name tag transmitted by the client. If the **any** service is configured for the default action, **drop**, the router drops the PADR packet. If the **any** service is configured for a nondefault action (**terminate** or **delay**), the router evaluates the other attributes configured for the **any** service.

Related Documentation

- Understanding PPPoE Service Name Tables
- Benefits of Configuring PPPoE Service Name Tables
- Configuring PPPoE Service Name Tables
- Example: Configuring a PPPoE Service Name Table for Dynamic Subscriber Interface Creation on page 481

PART 12

Dynamic Firewall Filters, Service Sets and HTTP Redirect for Subscriber Access

CHAPTER 45

Dynamic Firewall Filters and Service Sets Overview

Dynamic Firewall Filters Overview

Firewall filters provide rules that define whether to permit or deny packets that are transiting an interface on a router. The subscriber management feature supports two categories of firewall filters—classic filters and fast update filters. Classic filters are compiled at commit time and then, when a service is activated, an interface-specific clone of the filter is created and attached to a logical interface. Classic filters are static filters, and therefore cannot contain subscriber-specific terms (also called rules). Fast update filters are similar to classic filters in many ways. However, fast update filters support subscriber-specific, rather than interface-specific, filter values. Fast update filters also allow individual filter terms to be incrementally added or removed from filters without requiring that the entire filter be recompiled for each modification. Fast update filters are essential for networking environments in which multiple subscribers might share the same logical interface

You configure firewall filters to determine whether to permit or deny traffic before it enters or exits an interface to which the firewall filter is applied. An *input* (or *ingress*) firewall filter is one that is applied to packets that are entering a network. An *output* (or *egress*) firewall filter is one that is applied to packets that are exiting a network. You can configure firewall filters to subject packets to filtering or class-of-service (CoS) marking (grouping similar types of traffic together and treating each type of traffic as a class with its own level of service priority).

What makes firewall filters “dynamic” is the ability of the router to apply them to interfaces dynamically. This dynamic application is performed by associating input or output dynamic filters to a dynamic profile. When triggered, a dynamic profile can apply a named filter or a filter specified in RADIUS to an interface.

Related Documentation

- Classic Filters Overview on page 488
- Fast Update Filters Overview on page 496
- Dynamically Attaching Statically Created Filters for Any Interface Type on page 504
- Dynamically Attaching Statically Created Filters for a Specific Interface Family Type on page 503
- Dynamically Attaching Filters Using RADIUS Variables on page 505

Classic Filters Overview

The dynamic firewall feature supports classic filters and fast update filters. Classic filters are compiled at commit time. When a service activation takes place, the router creates an interface-specific clone of the filter and attaches the clone to the specified logical interface. Classic filters are static filters, and therefore cannot contain subscriber-specific terms, as opposed to fast update filters, which are subscriber-specific.

This overview covers:

Classic Filter Types

The following classic filter types are supported:

- Port (Layer 2) firewall filter—Port firewall filters apply to Layer 2 switch ports. You can apply port firewall filters only in the ingress direction on a physical port.
- VLAN firewall filter—VLAN firewall filters provide access control for packets that enter a VLAN, are bridged within a VLAN, and leave a VLAN. You can apply VLAN firewall filters in both ingress and egress directions on a VLAN. VLAN firewall filters are applied to all packets that are forwarded to or forwarded from the VLAN.
- Router (Layer 3) firewall filter—You can apply a router firewall filter in both ingress and egress directions on Layer 3 (routed) interfaces.

Classic Filter Components

When creating a classic filter, you first define the family address type (**inet** or **inet6**) and then you define one or more terms that specify the filtering criteria and the action to take if a match occurs.

Each term, or rule, consists of the following components:

- Match conditions—Specifies values or fields that the packet must contain. You can define various match conditions, including the IP source address field, IP destination address field, Transmission Control Protocol (TCP) or User Datagram Protocol (UDP) source port field, IP protocol field, Internet Control Message Protocol (ICMP) packet type, TCP flags, and interfaces.
- Actions—Specifies what to do if a match condition occurs. Possible actions are to accept or discard a packet. In addition, packets can be counted to collect statistical information. If no action is specified for a term, the default action is to accept the packet.

Classic Filter Processing

The order of the terms within a classic filter is important. Packets are tested against each term in the order in which the terms are listed in the firewall filter configuration. When a firewall filter contains multiple terms, the router takes a top-down approach and compares a packet against the first term in the firewall filter. If the packet matches the first term, the router executes the action defined by that term to either permit or deny the packet, and no other terms are evaluated. If the router does not find a match between the packet and first term, it then compares the packet to the next term in the firewall filter by using the same match process. If no match occurs between the packet and the second term, the router continues to compare the packet to each successive term defined in the firewall filter until a match is found. If a packet does not match any terms in a firewall filter, the default action is to discard the packet.

In addition to the top-down term processing within filters, you can specify a precedence (from 0 through 255) for input and output filters within a dynamic profile to force filter processing in a particular order. Setting a lower precedence value for a filter gives it a higher precedence within the dynamic profile. In other words, filters with lower precedence values are applied to interfaces before filters with higher precedence values. A precedence of zero (the default) gives the filter the highest precedence. If no precedence is specified, the filter receives a precedence of zero (highest precedence). Filters with matching precedence (zero or otherwise) are applied in random order.

NOTE: Dynamic filters do not process outbound packets that are sourced from the routing engine. To filter outbound packets that are sourced from the routing engine, you can create static outbound filters for each interface.

Guidelines for Creating and Applying Classic Filters for Subscriber Interfaces

This release does not support the dynamic configuration of firewall filters. However, you can create static firewall filters for interfaces as you do normally, and then dynamically apply those filters to statically created interfaces using dynamic profiles. You can also use dynamic profiles to attach input and output filters through RADIUS.

When creating and applying filters, keep the following in mind:

- This release supports dynamic application of only input and output filters.
- The filters must be interface-specific.
- You can create family-specific **inet** and **inet6** filters.
- You can create interface-specific filters at the **unit** level that apply to any family type (**inet** or **inet6**) configured on the interface.
- You can add or remove both IPv4 and IPv6 filters with the same service activation or deactivation.
- You can remove one filter type without impacting the other type of filter. For example, you can remove IPv6 filters and leave the current IPv4 filters active.
- You can chain up to five input filters and four output filters together.
- If you do not configure and apply a filter, the interface uses the default group filter configuration.
- You cannot modify or delete a firewall filter while subscribers on the same logical interface are bound.

Related Documentation

- Dynamic Firewall Filters Overview on page 487
- Fast Update Filters Overview on page 496
- Dynamically Attaching Statically Created Filters for Any Interface Type on page 504
- Dynamically Attaching Statically Created Filters for a Specific Interface Family Type on page 503
- Dynamically Attaching Filters Using RADIUS Variables on page 505
- Verifying and Managing Firewall Filter Configuration on page 524

Basic Classic Filter Syntax

This section provides the basic classic filter CLI statement syntax. The first part of this syntax provides the CLI statements to associate an input and output filter to a dynamic profile. The second part of this syntax represents the configured input and output filters associated to the dynamic profile. When a DHCP event occurs, the dynamic profile applies the specified filters to the DHCP client interface on the router.

```
[edit]
dynamic-profiles profile-name {
   interfaces {
```

```
    $junos-interface-ifd-name {
      unit $junos-underlying-interface-unit {
        family  family {
          filter {
            input {
              filter-name;
              precedence precedence;
            }
            output {
              filter-name;
              precedence precedence;
            }
          }
        }
      }
    }
  [edit]
  firewall {
    family family {
      filter filter-name {
        [desired filter configuration]
      }
      filter filter-name {
        [desired filter configuration]
      }
    }
  }
```

Related Documentation

- Dynamically Attaching Statically Created Filters for a Specific Interface Family Type on page 503
- Dynamic Firewall Filters Overview on page 487

Ascend-Data-Filter Policies for Subscriber Management Overview

Subscriber management enables you to use Ascend-Data-Filters to create policies for subscriber traffic. An Ascend-Data-Filter is a binary value that is configured on the RADIUS server. The filter contains rules that specify match conditions for traffic and an action for the router to perform (such as accept or discard the traffic). The match conditions might include the source and destination IP address or port, the protocol, the filter direction, the traffic class, and policer information.

Subscriber management uses a dynamic profile to obtain the Ascend-Data-Filter attribute (RADIUS attribute 242) from the RADIUS server and apply the policy to a subscriber session. Dynamic profiles support Ascend-Data-Filters for **inet** and **inet6** family types, and both families can be present in a dynamic profile. You include Junos predefined variables in the dynamic profiles — **$junos-adf-rule-v4** for family **inet** and **$junos-adf-rule-v6** for **inet6**. The predefined variables map the Ascend-Data-Filter rules to Junos functionality.

You can also configure a static Ascend-Data-Filter by manually entering the required binary data as a hexadecimal string in a dynamic profile. A statically configured

Ascend-Data-Filter in a dynamic profile takes precedence over an Ascend-Data-Filter attribute that is received from RADIUS. The static method is time-consuming to configure, and, therefore, is typically used only for testing purposes.

The Ascend-Data-Filter attribute is supported in RADIUS Access-Accept and Change of Authorization (CoA) messages.

CoA updates existing filters based on the Ascend-Data-Filter Type field, as shown in the following list:

- If the Type field is 1, IPv4 rules are updated and IPv6 rules are unchanged. The opposite is true if the Type field is 3.
- If both Type 1 and 3 are specified, then all rules are updated.
- If the CoA has no Ascend-Data-Filter rules, then the existing rules are unchanged.

Filter Naming Conventions

Each Ascend-Data-Filter has a unique name, which is assigned by the dynamic firewall daemon. The assigned names are displayed in the results of the **show subscriber extensive** and **show firewall** commands. Ascend-Data-Filters use the following naming convention.

__junos_adf_*session#-interfacename-family-direction*

For example:

__junos_adf_33847-ge/1/0/4.53-init-in

Each Ascend-Data-Filter rule maps into a single term, and the term names are simply **t0**, **t1**, **t3**. If you configure the **counter** option, the router adds a count action to each term that is created. The counter names are a combination of the the term names with **-cnt** appended. For example **t0-cnt** and **t1-cnt**.

Using Multiple Sessions with Ascend-Data-Filters on an Interface

An interface can have multiple subscriber sessions, each session using its own Ascend-Data-Filter rules. When an Ascend-Data-Filter is applied to a subscriber session, the rules are created independently of any other filters and are added to the interface filter list. The Ascend-Data-Filter rules for the other sessions on the same interface are also added to the filter list. All packets that are processed for the interface must go through all filters. and the filters are applied according to the precedence you set.

Because the filter list can be a combination of several rules, you must consider how the multiple filters coexist. You must ensure that the filters are designed and applied correctly in order to provide the desired filtering and resulting action. For example, a session might have a filter that accepts traffic from Subscriber-A, and that discards all other traffic. However, a second session on the same interface might have a filter that accepts traffic from Subscriber-B only and discards other traffic. When the two filters are combined in the filter list, traffic from Subscriber-B is discarded by the first filter, and traffic from Subscriber-A is discarded by the second filter. As a result, no traffic would be accepted

on the interface because the two filters essentially cancel out each other and discard all traffic.

Related Documentation

- Dynamically Applying Ascend-Data-Filter Policies to Subscriber Sessions on page 509
- Ascend-Data-Filter Attribute Fields on page 493

Ascend-Data-Filter Attribute Fields

Table 46 on page 493 provides information about the fields used in the Ascend-Data-Filter attribute (RADIUS attribute 242) and how the fields map to Junos filter functions. The table lists the fields in the order in which they occur in the Ascend-Data-Filter attribute.

Table 46: Ascend-Data-Filter Attribute Fields

Action or Classifier	Format	Value	Junos Filter Function
Type	1 byte	• 1 = IPv4 • 3 = IPv6	
Filter or forward	1 byte	• 0 = filter • 1 = forward	• 0 = maps to **discard** action • 1 = maps to **accept** action
Indirection	1 byte	• 0 = egress • 1 = ingress	• 0 = adds egress terms to the output filter • 1= adds ingress terms to the input filter
Spare	1 byte	–	–
Source IP address	IPv4 = 4 bytes IPv6 = 16 bytes	IP address of the source interface	• 0 = no mapping performed • From **source-address** ***address*** entry added to term
Destination IP address	IPv4 = 4 bytes IPv6 = 16 bytes	IP address of the destination interface	• 0 = no mapping performed • From **destination-address** ***address*** entry added to term
Source IP prefix	1 byte	• Type 1 = Number of leading zeros in the wildcard mask • Type 3 = Higher order contiguous bits of the address that comprise the network portion of the address	• 0 = no mapping performed • From **source-address** ***prefix*** entry added to term

Table 46: Ascend-Data-Filter Attribute Fields *(continued)*

Action or Classifier	Format	Value	Junos Filter Function
Destination IP prefix	1 byte	• Type 1 = Number of leading zeros in the wildcard mask • Type 3 = Higher order contiguous bits of the address that comprise the network portion of the address	• 0 = no mapping performed • From **destination-address** ***prefix*** entry added to term
Protocol	1 byte	Protocol type	• 0 = no mapping performed • IPv4 = from **protocol** ***number*** added to term • IPv6 = from **next-header** ***number*** added to term
Established	1 byte	Not implemented	Not implemented
Source port	2 bytes	Port number of the source port	From **source-port** *x* **-** *y* entry added to term
Destination port	2 bytes	Port number of the destination port	From **destination-port** *x* **-** *y* entry added to term
Source port qualifier	1 byte	• 0 = no compare • 1 = less than • 2 = equal to • 3 = greater than • 4 = not equal to	• 0 = no mapping performed • 1 – 3 = mapped to corresponding option • 4 = mapped to **except** match option
Destination port qualifier	1 byte	• 0 = no compare • 1 = less than • 2 = equal to • 3 = greater than • 4 = not equal to	• 0 = no mapping performed • 1 – 3 = mapped to corresponding match option • 4 = mapped to **except** match option
Reserved	2 bytes	Not used	Not used
Marking value	1 byte	• For IPv4 = Type of Service (ToS) • For IPv6 = Differentiated Services Code Point (DSCP)	Not implemented
Marking mask	1 byte	0 = no packet marking	Not implemented

Table 46: Ascend-Data-Filter Attribute Fields *(continued)*

Action or Classifier	Format	Value	Junos Filter Function
Traffic class	1–41 bytes	• 0 = no traffic class (required if there is no profile) • First byte specifies the length of the ASCII name of the traffic class • Traffic class must be statically configured • Name can optionally be null terminated, which consumes 1 byte • If a name is given, it must match one of the default forwarding classes (e.g., best-effort) or the name of a forwarding class configured under the **[edit class-of-service scheduler-maps *map-name*]** stanza.	Maps to the forwarding class name. The action **forwarding-class *name*** is added to term.
Rate-limit profile	1–41 bytes	• 0 = no rate limit (required if there is no profile) • First byte specifies the length of the ASCII, followed by the ASCII name of the profile • Profile must be statically configured • Name can optionally be null terminated, which consumes 1 byte • If a name is given, it must match the name of one of the firewall policers that is configured under the **[edit firewall]** stanza.	Maps to the **policer *policer-name*** action modifier of the same name. The action **policer *name*** is added to term.

Related Documentation

•

Fast Update Filters Overview

The dynamic firewall feature supports classic filters and fast update filters. Fast update filters support subscriber-specific filter values, as opposed to classic filters, which are interface-specific. Fast update filters allow individual filter terms, or rules, to be added or removed from filters without requiring that you recompile the filter after each modification—terms are added and removed when subscriber services are added and removed.

Using the fast update filters feature involves three distinct operations:

1. Creating the filter—You define fast update filters under the **[edit dynamic-profiles *profile-name* firewall family *family*]** hierarchy. The **dynamic-profiles** stanza enables you to use dynamic variables to create subscriber-specific configurations for the filter's match terms. See "Configuring Fast Update Filters" on page 513.
2. Associating the filter to a dynamic profile—You use the **[edit dynamic-profiles *profile-name* interface *interface-name* unit *unit-number* family *family*** hierarchy to associate the filter to a dynamic profile. This is the same procedure used for classic filters. See "Associating Fast Update Filters to Interfaces in a Dynamic Profile" on page 523.
3. Attaching the filter to an interface—When a subscriber logs in, the dynamic profile instantiates the subscriber session and applies the properties of the profile, including the fast update filter, to the session interface. This is the same procedure used for classic filters. Also, similar to classic filters, the name of fast update filters can be provided in a user's RADIUS file.

When a dynamic profile instantiates a subscriber session and applies a fast update filter, the router verifies that the filter is not already present on the session interface. If the filter is not present, the router adds the filter. If the filter is already present on the interface, the router simply adds any new terms that are not in the existing filter. This procedure is reversed when subscriber sessions are deleted. Any terms that were added by a session are then removed when the session is deleted. The filter is deleted when the last subscriber session is deleted.

NOTE: You can optionally specify that a term can be added only once and cannot be modified. See "Match Conditions and Actions in Fast Update Filters" on page 500.

This overview covers:

Fast Update Filter Components

When creating a fast update filter, you define one or more terms that specify the filtering criteria and the action to take when a match occurs.

Each term consists of the following components:

- Match condition—Specifies values or fields that the packet must contain. You can match a maximum of five fields in a fast update filter. A match condition can contain a single value or range. This differs from classic filters, in which terms can have multiple values. However, you can use additional terms to specify multiple ranges. "Fast Update Filter Match Conditions" on page 516 lists the supported match conditions for fast update filters. The order in which the terms appear in a fast update filter is not important, because the router examines the most specific term first. (Classic filters examine the terms in the order in which the terms are listed.)
- Action—Specifies what to do when a packet matches the match condition. If no action is specified for a term, the default action is to accept the packet. "Fast Update Filter Actions and Action Modifiers" on page 517 lists the supported actions for fast update filters.

Terms that are added to the filter during session instantiation must have a unique set of match conditions. Two terms overlap, or conflict, if a packet can match both sets of conditions—as a result, there are two different actions for the packet. You can ensure that terms are unique by using the **$junos-subscriber-ip-address** variable as the **source-address** (for an input filter) or **destination-address** (for an output filter) in the **from** statement. You must then supply the **source-address** or **destination-address** condition, as appropriate, as the first condition in the **match-order** statement.

Related Documentation

- Fast Update Filter Actions and Action Modifiers on page 517
- Fast Update Filter Match Conditions on page 516
- Avoiding Conflicts When Terms Are Matched on page 518

Fast Update Filter Processing

You must use the **match-order** statement to explicitly specify the order in which the router examines filter match conditions. Also, the router examines only those conditions that you include in the **match-order** statement. When a fast update filter contains multiple terms, the router compares a packet against the terms starting with the most specific condition first. When the packet first matches a condition, the router performs the action defined in the term to either permit or deny the packet, and then no other terms are evaluated. If the router does not find a match between the packet and first term, it then compares the packet to the next term in the filter. The router continues to compare the packet to the next specified term until a match is found. If there is no match after all terms have been examined, the router silently drops the packet.

You can specify a precedence (from 0 through 255) for input and output filters within a dynamic profile to force filter processing in a particular order. Setting a lower precedence value for a filter gives it a higher precedence within the dynamic profile. In other words,

filters with lower precedence values are applied to interfaces before filters with higher precedence values. A precedence of zero (the default) gives the filter the highest precedence. If no precedence is specified, the filter receives a precedence of zero (highest precedence). Filters with matching precedence (zero or otherwise) are applied in random order.

Fast Update Filter Names

When a filter is attached to an interface, the router first searches for a classic filter with the specified name, and then uses the classic filter. If no classic filter exists with that name, the router then searches in the dynamic-profile for a fast update filter with the specified name, and uses that filter.

If two different dynamic-profiles include a fast update filter with the same name, the **match-order** specification of the two filters must be identical. If the two filters are activated on the same interface, the terms are added together.

The router includes the filter name in **show firewall** command results. The router also creates unique names for filter terms and counters for **show firewall** command.

When a fast update filter is created by the activation of a dynamic profile, the router creates an interface-specific name for the filter. The name uses the following format, which is also used for classic filters:

<filter-name>-<interface-name>.<subunit>-<direction>

For example, an input filter named **httpFilter** on interface **ge-1/0/0.5** is named as follows (**in** indicates an input filter and **out** indicates an output filter):

http-filter-ge-1/0/0.5—in

The router creates unique names for the filter terms and counters by appending the session ID to all term and counter names. Terms that use the **only-at-create** statement have a session-id of 0. Terms and counters use the following format:

<term-name>-<session-id>

<counter-name>-<session-id>

Guidelines for Creating and Applying Fast Update Filters

Fast update filters enable you to create subscriber-specific firewall filters and dynamically apply these filters to statically created interfaces using dynamic profiles. Individual terms can be added to, or removed from, a filter without requiring that the entire filter be recompiled.

When creating and applying fast update filters, keep the following in mind:

- This release supports dynamic application of input and output filters.
- Fast update filters must always include terms that permit DHCP traffic to pass. See “Configuring Filters to Permit Expected Traffic” on page 517.
- You can create **family inet** and **inet6** filters.

- You can add or remove both IPv4 and IPv6 filters with the same service activation or deactivation.
- You can remove one filter type without impacting the other type of filter. For example, you can remove IPv6 filters and leave the current IPv4 filters active.
- The **interface-specific** statement is required for all fast update filters.
- The **match-order** statement is required—you must explicitly state the order of the match fields in a fast update filter. See "Configuring the Match Order for Fast Update Filters" on page 514.
- The **match-order** statement uses an implied wildcard for conditions that you specify in the statement. If you specify a condition that is not also configured in the **from** specification of a filter term, the router considers that a wildcard for that condition.
- A filter term can have only a single value or range; however, you can configure multiple terms to specify multiple ranges.
- You can match a maximum of five match conditions in a filter.

Related Documentation

- Dynamic Firewall Filters Overview on page 487
- Classic Filters Overview on page 488
- Dynamically Attaching Statically Created Filters for Any Interface Type on page 504
- Dynamically Attaching Statically Created Filters for a Specific Interface Family Type on page 503
- Verifying and Managing Firewall Filter Configuration on page 524

Basic Fast Update Filter Syntax

This section shows the basic fast update filter statement syntax. The first part of this syntax provides the CLI statements to associate an input and output filter to a dynamic profile. The second part of this syntax represents the configured input and output filters associated to the dynamic profile. When a DHCP event occurs, the dynamic profile applies the specified filters to the DHCP client interface on the router.

```
[edit dynamic-profiles profile-name]
interfaces {
   $junos-interface-ifd-name {
      unit $junos-underlying-interface-unit {
         family family {
            filter {
               input filter-name;
               precedence precedence;
               output filter-name;
               precedence precedence;
            }
         }
      }
   }
}
[edit dynamic-profiles profile-name]
```

```
firewall {
  family family {
    fast-update-filter filter-name {
      [desired filter configuration]
    }
    fast-update-filter filter-name {
      [desired filter configuration]
    }
  }
}
```

Related Documentation

- Configuring Fast Update Filters on page 513

Match Conditions and Actions in Fast Update Filters

To create a fast update filter, you use the **term** statement to specify conditions that a packet must have, and to specify the action the router performs when those conditions exist in the packet.

This section covers:

- Match Conditions on page 500
- Actions on page 501
- Adding Terms Only Once on page 501

Match Conditions

Match conditions specify characteristics that a packet must have—if the conditions exist in the packet, the router then performs the specified action. You use the **from** keyword in the **term** statement to specify match conditions for the filter. The packet must match all conditions in the **from** specification for the action to be performed, which also means that their order in the **from** specification is not important.

An individual condition in a **from** specification can contain a single value or range. You can match a maximum of five match conditions in a filter.

"Fast Update Filter Match Conditions" on page 516 lists the match conditions you can use in fast update filters.

NOTE: The router uses an implied wildcard for conditions that you include in the match-order statement. If you include a condition that is *not* configured in the from specification of a filter term, the router considers that a wildcard for the condition.

For example, if you include the dscp condition in the match-order statement, but do not configure a dscp value in the from specification of the filter term, the router performs the action configured in the then specification of the filter on all DSCP values.

Actions

Actions and action modifiers specify the operation the router performs when a particular match condition exists in a packet. You use the **then** keyword in the **term** statement to specify the actions to perform on packets whose characteristics match the conditions specified in the preceding **from** specification.

Action modifiers are actions taken in addition to the specified action. You can configure any combination of action modifiers. For the action or action modifier to take effect, all conditions in the **from** specification must match. If you specify **log** as one of the actions in a term, this constitutes a termination action; whether any additional terms in the filter are processed depends on the traffic through the filter. The action modifier operations carry a default **accept** action. For example, if you specify an action modifier and do not specify an action, the specified action modifier is implemented and the packet is accepted.

"Fast Update Filter Actions and Action Modifiers" on page 517 lists the actions and action modifiers you can use in fast update filters.

Adding Terms Only Once

You can optionally specify that a term can be added only when the fast update filter is first created, and cannot be later changed by adding or removing conditions. We recommend that you only use the **only-at-create** option for terms that do not include subscriber-specific data in their match conditions, such as common or default terms (counting the default drop packet, for instance).

Related Documentation

- Configuring Terms for Fast Update Filters on page 515
- Fast Update Filter Match Conditions on page 516
- Fast Update Filter Actions and Action Modifiers on page 517

Dynamic Service Sets Overview

A service set is a collection of services to be performed by an Adaptive Services (AS) or Multiservices PIC. You configure a service-set definition at the **[edit services]** hierarchy level. You can then apply the service set to one or more interfaces on the router. The service set can be applied either dynamically or statically.

To dynamically associate a service set to interfaces you include the **service-set** statement with the **input** or **output** statement at the **[edit dynamic-profiles** ***profile-name*** **interfaces** ***interface-name*** **unit** ***logical-unit-number*** **family** ***family*** **service]** hierarchy level.

To statically associate a defined service set with an interface, you include the **service-set** statement with the **input** or **output** statement at the **[edit interfaces** ***interface-name*** **unit** ***logical-unit-number*** **family** ***family*** **service]** hierarchy level.

Related Documentation

- Associating Service Sets to Interfaces in a Dynamic Profile on page 527
- Verifying and Managing Service Sets Information on page 528

- For information about creating service sets, see “Service Set Configuration Guidelines” in the *Junos Services Interfaces Configuration Guide*.
- For information about statically applying service sets to interfaces, see “Applying Filters and Services to Interfaces” in the *Junos Services Interfaces Configuration Guide*.

CHAPTER 46

Configuring Filters for Dynamic Profiles

Dynamically Attaching Statically Created Filters for a Specific Interface Family Type

You can dynamically attach statically created filters for either IPv4 (inet) or IPv6 (inet6) interface types. These filters would apply only to interfaces of the specified type.

Before you can attach a statically created filter using a dynamic profile.

1. Create the filters you want to attach.

   See the *Junos OS Policy Framework Configuration Guide* for detailed information about classic firewall filters and how to create them. See “Configuring Fast Update Filters” on page 513 for information about creating fast update filters.

2. Create a basic dynamic profile.

   See “Configuring a Basic Dynamic Profile” on page 349.

To dynamically attach statically created input and output filters:

1. Specify the unit family type you want to use when dynamically attaching the filters.

   a. For IPv4 interfaces, specify the **inet** unit family.

      ```
      [edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1]
      user@host# set family inet
      ```

   b. For IPv6 interfaces, specify the **inet6** unit family.

      ```
      [edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1]
      ```

```
user@host# set family inet6
```

2. Specify the input filter in the dynamic profile.

```
[edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1 family inet]
user@host# set filter input static-input-filter
```

3. Specify the output filter in the dynamic profile.

NOTE: The following example specifies an optional precedence value for the output filter.

```
[edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1 family inet]
user@host# set filter output static-output-filter precedence 50
```

Related Documentation

- Classic Filters Overview on page 488
- Fast Update Filters Overview on page 496
- Dynamically Attaching Statically Created Filters for Any Interface Type on page 504
- Dynamically Attaching Filters Using RADIUS Variables on page 505
- For information about Junos default groups, see the *Junos OS CLI User Guide*
- For information about firewall filters, see the *Junos OS Policy Framework Configuration Guide*

Dynamically Attaching Statically Created Filters for Any Interface Type

You can dynamically attach statically created filters for any interface type. These filters apply to any interfaces that are created using the dynamic profile.

Before you can attach a statically created filter using a dynamic profile.

1. Create the filters you want to attach.

   See the *Junos OS Policy Framework Configuration Guide* for detailed information about classic firewall filters and how to create them. See “Configuring Fast Update Filters” on page 513 for information about creating fast update filters.

2. Create a basic dynamic profile.

   See “Configuring a Basic Dynamic Profile” on page 349.

To dynamically attach statically created input and output filters for all interfaces created dynamically using the dynamic profile:

1. Access the dynamic profile, interface, and unit that you want to use when applying the static filters.

```
[edit]
user@host# edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1
```

2. Specify the input filter for the interface unit.

```
[edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1]
user@host# set filter input static-input-filter
```

3. Specify the output filter for the interface unit.

```
[edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1]
user@host# set filter output static-output-filter
```

Related Documentation

- Classic Filters Overview on page 488
- Fast Update Filters Overview on page 496
- Dynamically Attaching Statically Created Filters for a Specific Interface Family Type on page 503
- Dynamically Attaching Filters Using RADIUS Variables on page 505
- For information about Junos default groups, see the *Junos OS CLI User Guide*
- For information about firewall filters, see the *Junos OS Policy Framework Configuration Guide*

Dynamically Attaching Filters Using RADIUS Variables

You can attach filters to static interfaces by using dynamic profiles. By specifying a variable for the input and output filters, the dynamic profile uses RADIUS VSA attributes for ingress and egress policy.

RADIUS VSA	Attribute Name	Variable
26–10	Ingress-Policy-Name	$junos-input-filter
26–11	Egress-Policy-Name	$junos-output-filter
26–106	IPv6-Ingress-Policy-Name	$junos-input-ipv6-filter
26–107	IPv6-Egress-Policy-Name	$junos-output-ipv6-filter

Before you can attach a filter using RADIUS.

1. Create a basic dynamic profile.

   See “Configuring a Basic Dynamic Profile” on page 349.

2. Ensure that RADIUS ingress and egress policies are configured appropriately.

   See “Configuring RADIUS Server Parameters for Subscriber Access” on page 26.

To dynamically attach IPv4 input and output filters using RADIUS:

1. Specify the dynamic profile you want to attach, the interface, the logical unit number, and family **inet**.

```
[edit]
user@host# edit dynamic-profiles myProfile interface ge-1/1/1 unit 1 family inet
```

2. Specify the IPv4 input filter variable in the dynamic profile.

   [edit dynamic-profiles myProfile interfaces ge-1/1/1 unit 1 family inet]
   user@host# set filter input $junos-input-filter

3. Specify the IPv4 output filter variable in the dynamic profile.

   [edit dynamic-profiles myProfile interfaces ge-1/1/1 unit 1 family inet]
   user@host# set filter output $junos-output-filter

To dynamically attach IPv6 input and output filters using RADIUS:

1. Specify the dynamic profile you want to attach, the interface, the logical unit number, and family **inet6**.

   [edit]
   user@host# edit dynamic-profiles myProfile interface ge-1/1/1 unit 1 family inet6

2. Specify the IPv6 input filter variable in the dynamic profile.

   [edit dynamic-profiles myProfile interfaces ge-1/1/1 unit 1 family inet6]
   user@host# set filter input $junos-input-ipv6-filter

3. Specify the IPv6 output filter variable in the dynamic profile.

   [edit dynamic-profiles myProfile interfaces ge-1/1/1 unit 1 family inet6]
   user@host# set filter output $junos-output-ipv6-filter

Related Documentation

- Classic Filters Overview on page 488
- Dynamically Attaching Statically Created Filters for Any Interface Type on page 504
- Dynamically Attaching Statically Created Filters for a Specific Interface Family Type on page 503
- For more information about Junos default groups, see the *Junos OS CLI User Guide*
- For more information about firewall filters, see the *Junos OS Policy Framework Configuration Guide*

Defining Dynamic Filter Processing Order

You can force filter processing to occur in a particular order by using the **precedence** statement. You specify a precedence for input and output filters within a dynamic profile at the **[edit dynamic-profiles *profile-name* interfaces (*interface-name* | demux0) unit *logical-unit-number* family *family*]** hierarchy level.

The precedence range is from 0 to 250. Setting a lower precedence value for a filter gives it a higher precedence within the dynamic profile. A precedence of zero (the default) gives the filter the highest precedence. If no precedence is specified, the filter receives a precedence of zero (highest precedence). Filters with matching precedence (zero or otherwise) are applied in random order.

Before you define a precedence for a filter in a dynamic profile.

1. Create the filters you want to attach to the dynamic profile.

See the *Junos OS Policy Framework Configuration Guide* for detailed information about firewall filters and how to create them.

2. Create a basic dynamic profile.

   See "Configuring a Basic Dynamic Profile" on page 349.

3. Attach the filters to the dynamic profile.

   See "Dynamically Attaching Statically Created Filters for Any Interface Type" on page 504, "Dynamically Attaching Statically Created Filters for a Specific Interface Family Type" on page 503, or "Dynamically Attaching Filters Using RADIUS Variables" on page 505.

To define a precedence for an input and output filter:

1. Specify the input filter precedence in the dynamic profile.

   [edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **family** *family*]
   user@host# **set filter input precedence 50**

2. Specify the output filter precedence in the dynamic profile.

   [edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **family** *family*]
   user@host# **set filter output precedence 5**

Related Documentation

- Classic Filters Overview on page 488
- For information about firewall filters, see the *Junos OS Policy Framework Configuration Guide*

Configuring Firewall Filter Bypass

You can streamline the filter process, decrease the amount of packet handling for each filter in a chain, and effectively bypass unnecessary filters by using the **service-filter-hit** match/action combination at the **[edit firewall family *family-name* filter *filter-name* term *term-name*]** hierarchy level.

To bypass firewall filters using the **service-filter-hit** match/action combination, you configure the **service-filter-hit** action in at least one filter in the chain and configure **service-filter-hit** match condition in any subsequent filters that you want to bypass. All packets must pass through each filter in a chain. However, once the **service-filter-hit** flag is set in a packet, the packet "bypasses" any subsequent filters that contain the **service-filter-hit** match condition and more efficiently passes (accepts) marked packets and accelerating the filter process.

NOTE: When using the service-filter-hit match/action combination, the order in which the filters are applied is important. You can ensure the order in which the filters are processed by specifying a filter precedence value for the interface. See "Defining Dynamic Filter Processing Order" on page 506 for more information about dynamic filter processing.

To bypass filter processing:

1. Specify the **service-filter-hit** action for any filters in a filter chain.

   ```
   [edit firewall family inet filter video term 1]
   user@host# set then service-filter-hit
   ```

   When the match conditions for the filter are met, the **service-filter-hit** action is set to indicate to subsequent filters that further processing is unnecessary.

2. Specify the **service-filter-hit** match condition in any filters with a lower precedence (that is, a higher **precedence** statement value) that you want to detect **service-filter-hit** actions applied from previous filters in the chain.

   ```
   [edit firewall family inet filter data term 1]
   user@host# set from service-filter-hit
   ```

3. Configure the filter to pass (accept) any packet that has a **service-filter-hit** action applied from any previous filters.

   ```
   [edit firewall family inet filter data term 1]
   user@host# set then accept
   ```

Related Documentation

- Classic Filters Overview on page 488
- Defining Dynamic Filter Processing Order on page 506
- Example: Bypassing Firewall Filters on page 539

Configuring Service Packet Counting

You can count service packets, applying them to a specific named counter (__junos-dyn-service-counter), for use by RADIUS, by specifying the **service-accounting** action at the **[edit firewall family *family-name* filter *filter-name* term *term-name* then]** hierarchy level.

Service packet counting is used by the router to provide volume statistics for subscribers on a per-service session basis. See "Configuring Per-Service Session Accounting" on page 25 for additional information, including descriptions of the RADIUS VSAs used for per-service session accounting.

To enable service packet counting:

1. Configure any match conditions that you want to count using the service accounting action. For example:

   [edit firewall family inet filter *filtername* term *term-name*]

```
user@host# set from source-address address
```

2. Specify the **service-accounting** action for the filter.

```
[edit firewall family inet filter filtername term term-name]
user@host# set then service-accounting
```

When the match conditions for the filter are met, the packet is counted and applied to the well-known service counter (__junos-dyn-service-counter) for use by the RADIUS server. This counter provides the volume statistics for per-service accounting.

Related Documentation

- Classic Filters Overview on page 488
- Defining Dynamic Filter Processing Order on page 506
- RADIUS Accounting Statistics for Subscriber Access Overview on page 22
- Configuring Per-Service Session Accounting on page 25
- Configuring Per-Subscriber Session Accounting on page 24
- Configuring Standard Firewall Filters
- Configuring Actions in Firewall Filter Terms

Dynamically Applying Ascend-Data-Filter Policies to Subscriber Sessions

Subscriber management enables you to use dynamic profiles to dynamically apply policies that are defined in Ascend-Data-Filters (RADIUS attribute 242) to subscriber sessions. The dynamic profiles include a Junos predefined variable that maps the rules and actions defined in the Ascend-Data-Filter to Junos features. The RADIUS administrator configures the Ascend-Data-Filter on the RADIUS server in a separate operation.

Subscriber management dynamic profiles use the following Junos predefined variables to map Ascend-Data-Filter rules to Junos filter functionality.

- **$junos-adf-rule-v4**—Used for IPv4 family **init**.
- **$junos-adf-rule-v6**—Used for IPv6 family **init6**.

To configure a dynamic profile to dynamically apply the policy defined by an Ascend-Data-Filter to a subscriber session:

1. Specify the dynamic profile in which you want to include the Ascend-Data-Filter. Specify the interface, the logical unit number, and the family type.

```
[edit]
user@host# edit dynamic-profiles profile-name interfaces interface-name unit
  logical-unit-number family family
```

2. Specify that you want to include an Ascend-Data-Filter in the dynamic profile.

```
[edit dynamic-profiles profile-name interfaces interface-name unit logical-unit-number
  family family]
user@host# edit filter adf
```

3. Specify the Junos predefined variable that maps the Ascend-Data-Filter actions to Junos filter functionality. Use the variable that corresponds to the specified family type.

   [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* adf]
   user@host# **set rule ($junos-adf-rule-v4 | $junos-adf-rule-v6)**

   NOTE: You can also statically configure the Ascend-Data-Filter in this step by entering the filter in hexadecimal format, rather than use a predefined variable. You might use a static filter for testing purposes.

4. (Optional) Enable the counter feature. The counter increments each time a packet matches the rule.

   [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* adf]
   user@host# **set counter**

5. (Optional) Specify the input precedence used to establish the order in which filters on the interface are applied. A lower precedence value equals a higher precedence. The precedence relates to other dynamic filters configured on the same interface.

   [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* adf]
   user@host# **set input-precedence** *precedence*

6. (Optional) Specify the output precedence used to establish the order in which filters on the interface are applied. A lower precedence value equals a higher precedence. The precedence relates to other dynamic filters configured on the same interface.

   [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* adf]
   user@host# **set output precedence** *precedence*

Related Documentation

- Ascend-Data-Filter Policies for Subscriber Management Overview on page 491
- Ascend-Data-Filter Attribute Fields on page 493
- Verifying and Managing Dynamic Ascend-Data-Filter Policy Configuration on page 510
- Example: Configuring Dynamic Ascend-Data-Filter Support for Subscriber Access on page 532
- Example: Configuring Static Ascend-Data-Filter Support for Subscriber Access on page 535

Verifying and Managing Dynamic Ascend-Data-Filter Policy Configuration

Purpose View or manage information for Ascend-Data-Filters.

Action

- To display statistics for Ascend-Data-Filters:

  user@host> **show firewall**

- To display firewall log information:

  user@host> **show firewall log**

- To clear filter counters:

  user@host> **clear firewall all**

Related Documentation

- Ascend-Data-Filter Policies for Subscriber Management Overview on page 491
- Dynamically Applying Ascend-Data-Filter Policies to Subscriber Sessions on page 509

CHAPTER 47

Configuring Fast Update Filters

Configuring Fast Update Filters

You configure a fast update filter in a dynamic profile—this enables you to use dynamic variables in the filter configuration. After you configure fast update filters, you then use the **dynamic-profiles** syntax to associate the filter to the subscriber interface.

To configure a fast update filter for subscriber access:

1. Access the dynamic profile you want to use.

   ```
   [edit]
   user@host# edit dynamic-profiles myProfile
   ```

2. Specify that you want to configure a firewall, and specify the family.

   ```
   [edit dynamic-profiles myProfile]
   user@host# edit firewall family inet
   ```

3. Specify that you want to configure a fast update filter and assign a name to the filter.

   ```
   [edit dynamic-profiles myProfile firewall family inet]
   user@host# edit fast-update-filter httpFilter
   ```

4. Specify the **interface-specific** statement. This statement is mandatory.

   ```
   [edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
   user@host# set interface-specific
   ```

5. Configure the match order to use for the filter terms.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
user@host# set match-order [source-address protocol destination-port]
```

See “Configuring the Match Order for Fast Update Filters” on page 514.

6. Specify that you want to configure a term for the filter and assign the name to the term. Configure the match conditions and actions for the term.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
user@host# edit term term1
```

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter term
  term1]
user@host# set from protocol tcp
user@host# set from source-address $junos-subscriber-ip-address
user@host# set from destination-port http
user@host# set then count http-cnt
```

See “Configuring Terms for Fast Update Filters” on page 515.

Related Documentation

- Configuring the Match Order for Fast Update Filters on page 514
- Configuring Terms for Fast Update Filters on page 515
- Associating Fast Update Filters to Interfaces in a Dynamic Profile on page 523
- Fast Update Filters Overview on page 496
- Dynamic Profiles Overview on page 325
- For information about firewall filters, see Configuring Standard Firewall Filters the *Junos OS Policy Framework Configuration Guide*

Configuring the Match Order for Fast Update Filters

You must include the **match-order** statement to explicitly specify the order in which router examines the match conditions. The router examines only those match conditions that you include in the statement. You can match a maximum of five conditions.

NOTE: If the **match-order** statement contains a condition that is not specified in the **from** statement of a term, the router considers that a wildcard for that condition.

If you use the same fast update filter in multiple dynamic profiles, you must configure the same match order for all profiles.

To configure the order in which the router examines the match conditions of a fast update filter:

1. Access the fast update filter:

```
[edit dynamic-profiles myProfile]
user@host# edit firewall family inet fast-update-filter httpFilter
```

2. Specify the mandatory **interface-specific** statement.

   ```
   [edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
   user@host# set interface-specific
   ```

3. Configure the match order for the match conditions in the filter. Use brackets to enclose multiple match conditions.

   ```
   [edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
   user@host# set match-order [source-address protocol destination-port]
   ```

Related Documentation

- Configuring Fast Update Filters on page 513
- Configuring Terms for Fast Update Filters on page 515
- Fast Update Filters Overview on page 496
- Dynamic Profiles Overview on page 325
- Fast Update Filter Match Conditions on page 516
- For information about firewall filters, see the *Junos OS Policy Framework Configuration Guide*

Configuring Terms for Fast Update Filters

A fast update filter consists of one or more terms. A term is made up of one or more match conditions and the action to take when a packet matches the specified conditions.

To configure a term for a fast update filter:

1. Access the fast update filter.

   ```
   [edit dynamic-profiles myProfile]
   user@host# edit firewall family inet fast-update-filter httpFilter
   ```

2. Create the new term and assign a name to the term.

   ```
   [edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
   user@host# set term term1
   ```

3. Configure the match condition for the term. See “Fast Update Filter Match Conditions” on page 516 for the supported match conditions for fast update filters.

   ```
   [edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
   user@host# set from protocol tcp
   user@host# set from source-address $junos-subscriber-ip-address
   user@host# set from destination-port http
   ```

4. Configure the action that the router takes when the match conditions are met. See “Fast Update Filter Actions and Action Modifiers” on page 517 for the supported actions for fast update filters.

   ```
   [edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
   user@host# set then accept
   ```

5. (Optional) Configure the action-modifiers that you want the router to take when the match conditions are met. See “Fast Update Filter Actions and Action Modifiers” on page 517 for the supported action-modifiers for fast update filters.

   [edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
   user@host# set then count http-cnt

6. (Optional) Configure the term to be added only once, when the fast update filter is first created.

   [edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
   user@host# set only-at-create

Related Documentation

- Configuring Fast Update Filters on page 513
- Configuring the Match Order for Fast Update Filters on page 514
- Fast Update Filters Overview on page 496
- Fast Update Filter Match Conditions on page 516
- Fast Update Filter Actions and Action Modifiers on page 517
- For additional information about firewall filter terms, see the following topics in the *Junos OS Policy Framework Configuration Guide*
  - Overview of Match Conditions in Firewall Filter Terms
  - Configuring Actions in Firewall Filter Terms

Fast Update Filter Match Conditions

Table 47: Fast Update Filter Match Conditions

Match Condition	Description
destination-address *prefix*	IP destination address field.
destination-port *number*	TCP or UDP destination port field. Can be a single number, a single range, or one of the standard port synonyms.
dscp *number*	The differentiated services code point. Can be a single number, a single range, or the standard synonyms. IPv4 only.
match-terms *string-of-conditions*	A series of match conditions. Enclose the string within a set of quotation marks and use semicolons to separate entries. For example, **match-terms “protocol tcp; destination-port http”;**. Dynamic profile variables are not allowed in the string.
protocol *number*	IP protocol field. Can be a single number, as single range, or one of the standard protocol synonyms. IPv4 only.
source-address *prefix*	IP source address field.
source-port *number*	TCP or UDP source port field. Can be a single number, as single range, or one of the standard protocol synonyms.

Fast Update Filter Actions and Action Modifiers

Table 48: Fast Update Filter Actions and Action Modifiers

Action or Action Modifier	Description
Actions	
accept	Accept the packet.
action-terms *string-of-actions*	A series of multiple actions or action modifiers. Enclose the string within a set of quotation marks and use semicolons to separate entries. For example, **action-terms "log; count http-cnt";**. Dynamic profile variables are not allowed in the string.
discard	Drop the packet silently, without sending an Internet Control Message Protocol (ICMP) message.
ignore-term	Do not add this term to the filter. All match conditions and actions are ignored.
port-mirror	Port mirror packets.
routing-instance *routing-instance*	Forward packets to specified routing instance.
Action-Modifiers	
count *counter-name*	Increment the specified counter.
forwarding-class *class*	Classify the packet into one of the following forwarding classes: **as**, **assured-forwarding**, **best-effort**, **expedited-forwarding**, or **network-control**.
log	Log the packet header information.
loss-priority (high | medium-high | medium-low| low)	Set the loss priority level for packets.
policer *policer-name*	Rate-limit packets based on the specified policer.

Configuring Filters to Permit Expected Traffic

You must explicitly configure your firewall filter to permit expected traffic, such as DHCP traffic, to pass. Otherwise, the expected traffic is denied when the filter is applied to the interface. This requirement applies to both classic and fast update filters.

The following example shows a fast update filter that might be used to permit DHCP traffic. The actual filter you use depends on the expected traffic in your network.

In the example, the term **allow-dhcp** permits all DHCP traffic from all source addresses. The term also includes the **only-at-create** option to specify that the term is applied only

when the filter is first applied. The term **sub-allow-dhcp** includes the Junos predefined variable **$junos-subscriber-ip-address**, which permits all subscriber-specific DHCP traffic.

The **match-order** statement configuration lists the conditions from most-specific to least-specific, as recommended in "Configuring the Match Order for Fast Update Filters" on page 514. Because this filter is designed to permit ingress DHCP traffic, the **source-address** condition is listed first.

```
firewall {
    family inet {
        fast-update-filter psf1 {
            interface-specific;
            match-order [ source-address destination-address protocol destination-port ];
            term allow-dhcp {
                only-at-create;
                from {
                    source-address 0.0.0.0/32;
                    destination-address 255.255.255.255/32;
                    destination-port 67;
                    protocol udp;
                }
                then accept;
            }
            term sub-allow-dhcp {
                from {
                    source-address $junos-subscriber-ip-address;
                    destination-address 192.168.1.2/32;
                    destination-port 67;
                    protocol udp;
                }
                then accept;
            }
        }
    }
}
```

Related Documentation

- Configuring the Match Order for Fast Update Filters on page 514
- Configuring Terms for Fast Update Filters on page 515

Avoiding Conflicts When Terms Are Matched

A fast update filter can contain multiple terms, each with a variety of match conditions. However, when you configure multiple terms in a filter, you must ensure that the terms do not overlap, or conflict with each other. Two terms are considered to overlap when it is possible for a packet to match all conditions of both terms. Because each term specifies a different action for matches, the router cannot determine which action to take. When terms overlap, a conflict error occurs and the session fails when the dynamic profile attempts to apply the filter. The error log indicates the overlapping terms.

How the Router Evaluates Terms in a Filter

The router creates a table of match conditions when examining terms. The table, which is similar to a routing table, is based on the conditions included in the **match-order** statement. When the router receives a packet, the router examines the packet's contents in the sequence specified in the **match-order** statement.

For example, using the sample configuration in the following Match-Order Example, the router first examines the packet's **source-address**, then the **destination-address**, and finally the **destination-port**. As shown in the following table, the two terms in the filter do not overlap because each term has a different **destination-port** specification. The router then takes the appropriate filter action for the term that matches the **destination-port** value of the packet.

Term	source-address	destination-address	destination-port	Action
t55	subscriber's address	3.1.1.2/32	http	count t55_cntr accept
t999	subscriber's address	3.1.1.2/32	https	count t999_cntr accept

Match-Order Example

```
firewall {
  family inet {
    fast-update-filter psf1 {
      interface-specific;
      match-order [ source-address destination-address destination-port ];
      term t55 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 3.1.1.2/32;
          destination-port http;
        }
        then {
          count t55_cntr;
          accept;
        }
      }
      term t999 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 3.1.1.2/32;
          destination-port https;
        }
        then {
          count t999_cntr;
          accept;
        }
      }
    }
  }
```

}

Using Implied Wildcards

This section shows an example of how you might use an implied wildcard specification in the match configuration. A condition in the **match-order** statement is an implied wildcard when that condition is not configured in the **from** specification of a term in the filter.

NOTE: When you use ranges (for example, a range of values or a wildcard) in terms, the ranges must not overlap—overlapping ranges create a conflict error. However, you can configure a range in one term and an exact match in another term. For example, in the following filter table, the wildcard destination port value in term t3 does not overlap the destination port specifications in terms t55 and t999 because the http and https values are exact matches.

In the Implied Wildcard Example configuration, the router views the **destination-port** condition in the **match-order** statement as an implied wildcard for term **t3**, because there is no **destination-port** value configured in that term. As a result, the wildcard specifies that for term **t3** any **destination-port** value is accepted. The filter table appears as follows:

Term	source-address	destination-address	destination-port	Action
t3	subscriber's address	3.1.1.2/32	any (wildcard)	count t3_cntr accept
t55	subscriber's address	3.1.1.2/32	http	count t55_cntr accept
t999	subscriber's address	3.1.1.2/32	https	count t999_cntr accept

In the following filter configuration, traffic with a destination port of **http** matches term **t55** and traffic with a destination port of **https** matches term **t999**. Traffic with a destination port other than **http** or **https** matches term **t3**, which is the implied wildcard.

Implied Wildcard Example

```
firewall {
   family inet {
      fast-update-filter psf1 {
         interface-specific;
         match-order [ source-address destination-address dscp protocol destination-port
            ];
         term t3 {
            from {
               source-address $junos-subscriber-ip-address;
               destination-address 3.1.1.2/32;
            }
            then {
```

```
            count t3_cntr;
            accept;
          }
        }
        term t55 {
          from {
            source-address $junos-subscriber-ip-address;
            destination-address 3.1.1.2/32;
            destination-port http;
          }
          then {
            count t55_cntr;
            accept;
          }
        }
        term t999 {
          from {
            source-address $junos-subscriber-ip-address;
            destination-address 3.1.1.2/32;
            destination-port https;
          }
          then {
            count t999_cntr;
            accept;
          }
        }
      }
    }
  }
```

Conflict Caused by Overlapping Ranges

This section shows two examples of overlapping ranges in terms. When you use ranges (such as a wildcard or a range of values) in terms, the ranges must not overlap—overlapping ranges create a conflict error and the session fails.

In the following filter configuration, the **destination-port** ranges in the two terms overlap. Ports in the range from 50 through 80 match both term **src0** and term **src1**, which each specify different actions to take.

NOTE: You can configure a range in one term and an exact match in another term. See the section, *Using Implied Wildcards*, for an example that uses a wildcard for a match condition in one term and an exact match for the condition in a second term.

Term	source-address	destination-address	destination-port	Action
src0	subscriber's address	10.1.1.2/32	0–80	count c1_cntr accept

Term	source-address	destination-address	destination-port	Action
src1	subscriber's address	10.1.1.2/32	50–100	count c2_cntr accept

Overlapping Ranges Example 1

```
firewall {
  family inet {
    fast-update-filter fuf–src {
      interface-specific;
      match-order [ source-address destination-address destination-port ];
      term src0 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 10.1.1.2/32;
          destination-port 0–80;
        }
        then {
          count c1_cntr;
          accept;
        }
      }
      term src1 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 10.1.1.2/32;
          destination-port 50–100;
        }
        then {
          count c2_cntr;
          accept;
        }
      }
    }
```

In this filter configuration, the **protocol** specification in terms **src21** and **src22** use the implied wildcard, which configures a range for each term. Because overlapping ranges are not allowed, a conflict error results.

Term	source-address	destination-address	protocol	destination-port	Action
src20	subscriber's address	10.1.1.2/32	udp	any (wildcard)	count c20_cntr accept
src21	subscriber's address	10.1.1.2/32	any (wildcard)	http	count c21_cntr accept
src21	subscriber's address	10.1.1.2/32	any (wildcard)	https	count c22_cntr accept

Overlapping Ranges Example 2

```
firewall {
  family inet {
    fast-update-filter fuf–src2 {
      interface-specific;
      match-order [ source-address destination-address protocol destination-port ];
      term src20 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 10.1.1.2/32;
          protocol udp;
        }
        then {
          count c20_cntr;
          accept;
        }
      }
      term src21 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 10.1.1.2/32;
          destination-port http;
        }
        then {
          count c21_cntr;
          accept;
        }
      }
      term src22 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 10.1.1.2/32;
          destination-port https;
        }
        then {
          count c22_cntr;
          accept;
        }
      }
    }
```

Related Documentation

- Configuring Fast Update Filters on page 513
- Configuring Terms for Fast Update Filters on page 515
- Configuring the Match Order for Fast Update Filters on page 514

Associating Fast Update Filters to Interfaces in a Dynamic Profile

After you configure the fast update filter, you reference the filter in the **interfaces** stanza of a dynamic profile. When the dynamic profile instantiates a subscriber session, the router applies the terms of the filter to the interface.

To apply a fast update filter to an interface in a dynamic profile:

1. Access the dynamic profile you want to use.

   ```
   [edit]
   user@host# edit dynamic-profiles myProfile
   ```

2. Specify the interface for the dynamic profile—use the dynamic interface variable.

   ```
   [edit dynamic-profiles myProfile]
   user@host# edit interfaces $junos-interface-ifd-name
   ```

3. Specify the underlying interface—use the unit number variable.

   ```
   [edit dynamic-profiles myProfile interfaces “$junos-interface-ifd-name”]
   user@host# edit unit $junos-underlying-interface-unit
   ```

4. Specify the family. Use **inet** if you are using IPv4 filters or **inet6** for IPv6 filters.

   ```
   [edit dynamic-profiles myProfile interfaces “$junos-interface-ifd-name” unit
     “$junos-underlying-interface-unit”]
   user@host# edit family inet
   ```

5. Specify the filters that you want to apply to the interface.

   ```
   [edit dynamic-profiles myProfile interfaces “$junos-interface-ifd-name” unit
     “$junos-underlying-interface-unit” family inet]
   user@host# set filter input httpFilter
   user@host# set filter output myOutFilter
   ```

Related Documentation

- Dynamic Profiles Overview on page 325
- Configuring Static Subscriber Interfaces in Dynamic Profiles on page 397
- Associating Dynamic Profiles with Statically Created Interfaces on page 399
- Fast Update Filters Overview on page 496
- For information about firewall filters, see Configuring Standard Firewall Filters the *Junos OS Policy Framework Configuration Guide*

Verifying and Managing Firewall Filter Configuration

Purpose View or manage information for firewall filters:

NOTE: The router creates unique names for fast update filters and for filter terms and counters. See *Naming Fast Update Filters* in “Fast Update Filters Overview” on page 496 for information.

Action

- To display statistics for firewall filters:

  ```
  user@host> show firewall
  ```

- To display firewall log information:

  ```
  user@host> show firewall log
  ```

- To clear filter counters:

  user@host> **clear firewall all**

Related Documentation

Classic Filters Overview on page 488

- Fast Update Filters Overview on page 496
- For more information, see the *Junos OS Routing Protocols and Policies Command Reference*

CHAPTER 48

Configuring Service Sets in Dynamic Profiles

Associating Service Sets to Interfaces in a Dynamic Profile

After you configure a service set, you use a dynamic profile to dynamically associate the service set to interfaces. You reference the filter in the **interfaces** stanza of a dynamic profile. When the dynamic profile instantiates a subscriber session, the router applies the terms of the filter to the interface.

To apply a service set to an interface in a dynamic profile:

1. Access the dynamic profile you want to use.

   ```
   [edit]
   user@host# edit dynamic-profiles myProfile
   ```

2. Specify the interface for the dynamic profile—use the dynamic interface variable.

   ```
   [edit dynamic-profiles myProfile]
   user@host# edit interfaces $junos-interface-ifd-name
   ```

3. Specify the underlying interface—use the unit number variable.

   ```
   [edit dynamic-profiles myProfile interfaces “$junos-interface-ifd-name”]
   user@host# edit unit $junos-underlying-interface-unit
   ```

4. Specify the family. Dynamic service sets are supported only on **family inet** (IPv4).

   ```
   [edit dynamic-profiles myProfile interfaces “$junos-interface-ifd-name” unit
     “$junos-underlying-interface-unit”]
   user@host# edit family inet
   ```

5. Specify the input and output service sets that you want to apply to the interface.

   ```
   [edit dynamic-profiles myProfile interfaces “$junos-interface-ifd-name” unit
     “$junos-underlying-interface-unit” family inet]
   user@host# set service input service-set inputService_200
   user@host# set service input post-service-filter postService_15
   user@host# set service output service-set outputService_320
   ```

Related Documentation

- Dynamic Service Sets Overview on page 501
- Verifying and Managing Service Sets Information on page 528
- For information about creating service sets, see "Service Set Configuration Guidelines" in the *Junos Services Interfaces Configuration Guide*.
- For information about statically applying service sets to interfaces, see Applying Filters and Services to Interfaces in the *Junos Services Interfaces Configuration Guide*.

Verifying and Managing Service Sets Information

Purpose View information for service sets:

Action

- To display summary information for service sets:

  user@host> **show services service-sets summary**

- To display interface-specific information for service sets:

  user@host>**show services service-sets summary interface *interface-name***

Related Documentation

- Dynamic Service Sets Overview on page 501
- Associating Service Sets to Interfaces in a Dynamic Profile on page 527
- For more information, see the *Junos System Basics and Services Command Reference*

CHAPTER 49

Firewall Filter Examples

Examples: Configuring Static Filters

This topic provides some static filter configuration examples.

```
firewall {
    policer p1 {
        if-exceeding {
            bandwidth-limit 5m;
            burst-size-limit 10m;
        }
        then discard;
    }
    family inet {
        filter dfwd {
            interface-specific;
            term 1 {
                from {
                    source-address {
                        192.1.1.0/24;
                    }
                }
                then {
                    count c1;
                    next term;
                }
            }
            term 2 {
                from {
                    source-address {
                        192.2.1.0/24;
                    }
```

```
        }
        then count c2;
    }
    term 3 {
        then accept;
    }
}
filter dfwd1 {
    interface-specific;
    term 1 {
        from {
            address {
                192.1.1.0/24;
            }
        }
        then {
            discard;
        }
    }
}
filter tos {
    interface-specific;
    term 1 {
        from {
            precedence priority;
        }
        then forwarding-class assured-forwarding;
    }
    term 2 {
        then {
            log;
            accept;
        }
    }
}
filter dfwd2 {
    interface-specific;
    term 1 {
        from {
            forwarding-class best-effort;
        }
        then {
            sample;
            forwarding-class expedited-forwarding;
        }
    }
    term 2 {
        then accept;
    }
}
filter nodhcp {
    term dhcpdiscover {
        from {
            protocol udp;
            source-port 68;
            destination-port 67;
```

```
            }
            then {
              discard;
            }
          }
          term others {
            then accept;
          }
        }
        filter p1 {
          interface-specific;
          term 1 {
            from {
              precedence priority;
            }
            then {
              policer p1;
              log;
            }
          }
          term 2 {
            then accept;
          }
        }
        filter dscp {
          interface-specific;
          term 1 {
            from {
              dscp af11;
            }
            then log;
          }
          term 2 {
            then accept;
          }
        }
        filter tcm {
          interface-specific;
          term 1 {
            from {
              dscp af11;
            }
            then policer p1;
          }
          term 2 {
            then accept;
          }
        }
      }
      traceoptions {
        flag dynamic;
      }
    }
```

Related Documentation

- Dynamically Attaching Statically Created Filters for Any Interface Type on page 504
- Dynamically Attaching Statically Created Filters for a Specific Interface Family Type on page 503

Example: Configuring Dynamic Ascend-Data-Filter Support for Subscriber Access

This example shows how to configure support for dynamic Ascend-Data-Filter policies.

Requirements

- Ensure that the Ascend-Data-Filter has been configured on the RADIUS server.
- Create the dynamic profile. See “Dynamic Profiles Overview” on page 325.
- Configure RADIUS support. See “Configuring RADIUS Server Parameters for Subscriber Access” on page 26.

Overview

Ascend-Data-Filters are configured on a RADIUS server, and contain rules that create policies. Subscriber management uses a dynamic profile to obtain the Ascend-Data-Filter attribute (RADIUS attribute 242) from the RADIUS server and apply the policy to a subscriber session.

- Specify the dynamic profile to use to apply the Ascend-Data-Filter policy to the subscriber session.
- Specify the Junos predefined variable that maps the Ascend-Data-Filter rules to Junos filter functionality.
- Configure optional settings, which include counting the rule usage and setting the precedence order for the filter.

Configuration

Step-by-Step Procedure

To configure dynamic Ascend-Data-Filter support:

1. Specify the dynamic profile in which you want to include the Ascend-Data-Filter, and configure the interface, the logical unit number, and the family type.

   ```
   [edit]
   user@host# edit dynamic-profiles adf-profile-v4 interfaces
     $junos-interface-ifd-name unit $junos-underlying-interface-unit family inet
   ```

2. Specify that you want to include an Ascend-Data-Filter in the dynamic profile and provide the Junos predefined variable as the rule that maps the Ascend-Data-Filter actions to Junos filter functionality.

```
[edit dynamic-profiles adf-profile-v4 interfaces “$junos-interface-ifd-name” unit
  “$junos-underlying-interface-unit” family inet]
user@host# set filter adf rule $junos-adf-rule-v4
```

3. Enable the counter for the rule.

```
[edit dynamic-profiles adf-profile-v4 interfaces “$junos-interface-ifd-name” unit
  “$junos-underlying-interface-unit” family inet]
user@host# set filter adf counter
```

4. Specify the precedence for received packets on the interface.

```
[edit dynamic-profiles adf-profile-v4 interfaces “$junos-interface-ifd-name” unit
  “$junos-underlying-interface-unit” family inet]
user@host# set filter adf input-precedence 75
```

5. Specify the precedence for transmitted packets on the interface.

```
[edit dynamic-profiles adf-profile-v4 interfaces “$junos-interface-ifd-name” unit
  “$junos-underlying-interface-unit” family inet]
user@host# set filter adf output precedence 80
```

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

```
[edit]
user@host# show dynamic-profiles
...
adf-profile-v4 {
  interfaces {
    "$junos-interface-ifd-name" {
      unit "$junos-underlying-interface-unit" {
        family inet {
          filter {
            adf {
              rule "$junos-adf-rule-v4";
              counter;
              input-precedence 75;
              output-precedence 80;
              ...
```

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

Verification

To confirm that the configuration is working properly, perform these tasks:

- Verifying that Dynamic Ascend-Data-Filter Rules are Applied to Subscriber Sessions on page 533
- Verifying Dynamic Ascend-Data-Filter Usage on page 534

Verifying that Dynamic Ascend-Data-Filter Rules are Applied to Subscriber Sessions

Purpose Verify that the Ascend-Data-Filter rules were attached to the subscriber.

Action From operational mode, enter the **show subscribers extensive** command.

```
user@host>show subscribers extensive
  Type: DHCP
  User Name: user1-adf
  IP Address: 192.168.1.10
  IP Netmask: 255.255.255.0
  Logical System: default
  Routing Instance: default
  Interface: ge-1/0/0.0
  Interface type: Static
  Dynamic Profile Name: adf-profile-v4
  MAC Address: 00:10:94:00:00:01
  State: Active
  Radius Accounting ID: 5
  Login Time: 2010-08-12 14:06:27 PDT
  ADF IPv4 Input Filter Name: __junos_adf_5-ge-1/0/0.0-inet-in
        Rule 0: 0101010064140000000000001000000000000500002
        Rule 1: 0101010064140000000000001000000000000510002
        Rule 2: 0101010064140000000000001000000000000520002
        Rule 3: 0101010064140000000000001000000000000530002
        Rule 4: 0101010064140000000000001000000000000540002
        Rule 5: 010101
```

Meaning The output shows the information for the dynamic profile, including Ascend-Data-Filter rules. Verify the following information:

- The User Name field indicates the correct subscriber.
- The Dynamic Profile Name field is correct for the subscriber.
- The correct Ascend-Data-Filter rules are applied to the subscriber. The display shows the rules that are configured on the RADIUS server.

Verifying Dynamic Ascend-Data-Filter Usage

Purpose Verify usage of the dynamic Ascend-Data-Filter. Counter statistics are displayed when the **counter** option is configured for the **adf** command in the dynamic profile.

Action From operational mode, enter the **show firewall** command.

```
user@host> show firewall

Filter: __junos_adf_5-ge-1/0/0.0-inet-in
Counters:
Name                                Bytes              Packets
t0-cnt                              32758                   22
t1-cnt                              22199                   15
t2-cnt                              21723                   14
t3-cnt                              17342                   11
t4-cnt                              15497                   10
t5-cnt                               6432                    4
```

Meaning The output shows the name of the filter and lists the counter activity. If the **counter** option is not configured, the output displays only the filter name.

Related Documentation

- Ascend-Data-Filter Policies for Subscriber Management Overview on page 491
- Dynamically Applying Ascend-Data-Filter Policies to Subscriber Sessions on page 509

Example: Configuring Static Ascend-Data-Filter Support for Subscriber Access

This example shows how to configure support for static Ascend-Data-Filter policies. In a static configuration, you manually configure the Ascend-Data-Filter as part of the dynamic profile configuration. This procedure differs from dynamic configuration, in which the Ascend-Data-Filter is defined on the RADIUS server and then subscriber management uses a predefined variable to map the Ascend-Data-Filter rules to Junos filter functionality. Because creating a static Ascend-Data-Filter configuration can be labor-intensive, you might typically use this method for testing purposes.

Requirements

- Create the dynamic profile. See “Dynamic Profiles Overview” on page 325.
- Configure RADIUS support. See “Configuring RADIUS Server Parameters for Subscriber Access” on page 26.

Overview

Ascend-Data-Filters contain rules that create policies. Subscriber management uses a dynamic profile to apply the policy to a subscriber session. You manually configure the Ascend-Data-Filter as part of the dynamic policy.

- Specify the dynamic profile to use to apply the Ascend-Data-Filter policy to the subscriber session.
- Configure the Ascend-Data-Filter.
- Configure optional settings, which include counting the rule usage and setting the precedence for received and transmitted traffic.

Configuration

Step-by-Step Procedure

To configure static Ascend-Data-Filter support:

1. Specify the dynamic profile in which you want to create the Ascend-Data-Filter, and configure the interface, the logical unit number, and the family type.

   ```
   [edit]
   user@host# edit dynamic-profiles adf-profile-v4 interfaces
     $junos-interface-ifd-name unit $junos-underlying-interface-unit family inet
   ```

2. Configure the Ascend-Data-Filter. Enclose the filter values within quotation marks. You can configure multiple Ascend-Data-Filter rules in the same dynamic profile.

```
[edit dynamic-profiles adf-profile-v4 interfaces “$junos-interface-ifd-name” unit
  “$junos-underlying-interface-unit” family inet]
user@host# set filter adf rule “01000100 0A020100 00000000 18000000
  00000000 00000000”
```

3. Enable the counter for the rule.

```
[edit dynamic-profiles adf-profile-v4 interfaces “$junos-interface-ifd-name” unit
  “$junos-underlying-interface-unit” family inet]
user@host# set filter adf counter
```

4. Specify the precedence for received packets on the interface.

```
[edit dynamic-profiles adf-profile-v4 interfaces “$junos-interface-ifd-name” unit
  “$junos-underlying-interface-unit” family inet]
user@host# set filter adf input-precedence 80
```

5. Specify the precedence for transmitted packets on the interface.

```
[edit dynamic-profiles adf-profile-v4 interfaces “$junos-interface-ifd-name” unit
  “$junos-underlying-interface-unit” family inet]
user@host# set filter adf output precedence 85
```

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

```
[edit]
user@host# show dynamic-profiles
...
adf-profile-v4 {
  interfaces {
    "$junos-interface-ifd-name" {
      unit "$junos-underlying-interface-unit" {
        family inet {
          filter {
            adf {
              rule "01000100 0A020100 00000000 18000000 00000000 00000000";
              counter;
              input-precedence 80;
              output-precedence 85;
              ...
```

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

Results The Ascend-Data-Filter rule defined in Step 2 of the procedure configures an input policy that filters all packets from network 10.2.1.0 with wildcard mask 255.255.255.0 to any destination.

Table 49 on page 536 lists the values specified in the Ascend-Data-Filter rule.

Table 49: Ascend-Data-Filter Rule

Action or Classifier	Hex Value	Junos Filter Function
Type	01	IPv4

Table 49: Ascend-Data-Filter Rule *(continued)*

Action or Classifier	Hex Value	Junos Filter Function
Forward	00	Forward
Indirection	01	Ingress
Spare	00	None
Source IP address	0a020100	10.2.1.0
Destination IP address	00000000	Any
Source IP mask	18	24 (255.255.255.0)
Destination IP mask	00	0 (0.0.0.0)
Protocol	00	None
Established	00	None
Source port	0000	None
Destination port	0000	None
Source port qualifier	00	None
Destination port qualifier	00	None
Reserved	0000	None

Verification

To confirm that the configuration is working properly, perform these tasks:

- Verifying that Static Ascend-Data-Filter Rules are Applied to Subscriber Sessions on page 537
- Verifying Static Ascend-Data-Filter Usage on page 538

Verifying that Static Ascend-Data-Filter Rules are Applied to Subscriber Sessions

Purpose Verify that the Ascend-Data-Filter rules you manually configured were attached to the subscriber.

Action From operational mode, enter the **show subscribers extensive** command.

```
user@host>show subscriber extensive
  Type: DHCP
  User Name: user1-adf
  IP Address: 192.168.1.10
```

```
IP Netmask: 255.255.255.0
Logical System: default
Routing Instance: default
Interface: ge-1/0/0.0
Interface type: Static
Dynamic Profile Name: adf-profile-v4
MAC Address: 00:10:94:00:00:01
State: Active
Radius Accounting ID: 5
Login Time: 2010-08-12 14:06:27 PDT
ADF IPv4 Input Filter Name: __junos_adf_5-ge-1/0/0.0-inet-in
        Rule 0: 010001000A020100000000001800000000000000000000000
```

Meaning The output shows the information for the dynamic profile, including Ascend-Data-Filter rules. Verify the following information:

- The User Name field indicates the correct subscriber.
- The Dynamic Profile Name field is correct for the subscriber.
- The correct static Ascend-Data-Filter rule is applied to the subscriber.

Verifying Static Ascend-Data-Filter Usage

Purpose Verify usage of the static Ascend-Data-Filter. Counter statistics are displayed when the **counter** option is configured for the **adf** command in the dynamic profile.

Action From operational mode, enter the **show firewall** command.

```
user@host> show firewall

Filter: __junos_adf_5-ge-1/0/0.0-inet-in
Counters:
Name                          Bytes              Packets
t0-cnt                        32758                   22
```

Meaning The output shows the name of the filter and the lists counter activity. If the **counter** option is not configured, the output displays only the filter name.

Related Documentation

- Ascend-Data-Filter Policies for Subscriber Management Overview on page 491
- Dynamically Applying Ascend-Data-Filter Policies to Subscriber Sessions on page 509

Example: Configuring Fast Update Filters for Subscriber Access

This example shows you how to configure a fast update filter that is an input filter that counts the HTTP and non-HTTP packets from a subscriber. In the example, you use the firewall stanza to create the filter and the interfaces stanza to attach the filter.

```
[edit dynamic-profiles myProfile]
firewall {
   family inet {
      fast-update-filter httpFilter {
```

```
        interface-specific;
        match-order [source-address protocol destination-port];
        term term1 {
          from {
            protocol tcp;
            source-address $junos-subscriber-ip-address;
            destination-port http;
          }
          then {
            count http-cnt;
          }
        }
        term term2 {
          from {
            protocol tcp;
            source-address $junos-subscriber-ip-address;
          }
          then {
            count non-http-cnt;
          }
        }
      }
    }
  }
  interfaces {
    "$junos-interface-ifd-name" {
      unit "$junos-underlying-interface-unit" {
        family inet {
          filter {
            input httpFilter;
          }
        }
      }
    }
  }
```

Related Documentation

- Configuring Fast Update Filters on page 513

Example: Bypassing Firewall Filters

This example describes how to configure multiple filters using the **service-filter-hit** match/action combination and contains the following sections:

- Before You Begin on page 539
- Filter Bypass Overview on page 540
- Configuring Filter Bypass on page 540

Before You Begin

When using the **service-filter-hit** match/action combination, keep the following in mind:

- The order in which the filters are applied is important. You can ensure the order in which the filters are processed by specifying a filter precedence value for the interface. See

"Defining Dynamic Filter Processing Order" on page 506 for more information about dynamic filter processing and how to use the **precedence** statement.

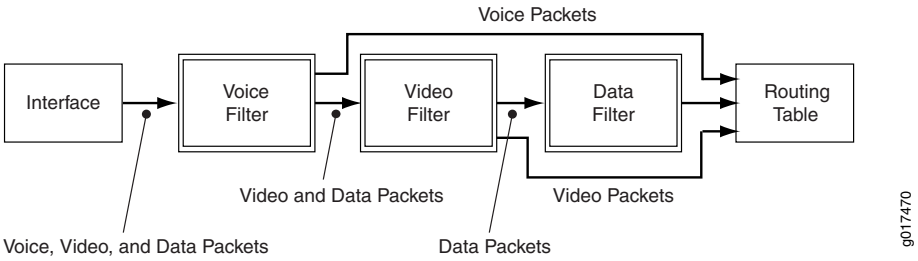
- The following example uses policers to further define the match conditions each filter uses. These filters are not described here. To better understand how to configure policers, see "Configuring Policers" in the *Policy Framework Configuration Guide*.

Filter Bypass Overview

Packets must pass through each filter in a chain. However, if you create a chain of filters to process different types of packets (for example, voice, video, and data packets), you can streamline the filter process, decreasing the amount of packet handling for each filter in the chain, effectively bypassing unnecessary filters, by using the **service-filter-hit** match/action combination at the **[edit firewall family *family-name* filter *filter-name* term *term-name*]** hierarchy level.

Figure 11 on page 540 shows the logical processing flow through a chain of three filters (voice, video, and data) where only processing for a specific data type is desired. This configuration example shows an ingress filter flow. Though subsequent ingress filters in a chain can detect whether the **service-filter-hit** action is set, egress filters would not. To bypass egress filters, you must also configure the **service-filter-hit** match/action combination on those filters.

Figure 11: Logical Flow Example for Filter Bypass Processing



Configuring Filter Bypass

- Configuring the Voice Filter on page 541
- Configuring the Video Filter on page 541
- Configuring the Data Filter on page 541

CLI Quick Configuration

To quickly configure this example:

```
[edit]
set firewall filter voice term T1 from address 1.1.1.1/32
set firewall filter voice term T1 from source-port 5004-5005
set firewall filter voice term T1 then forwarding-class assured-forwarding service-filter-hit
    accept
set firewall filter voice term default then accept
set firewall filter video term T1 from service-filter-hit
set firewall filter video term T1 then accept
set firewall filter video term T2 from source-address 10.10.10.10/32
set firewall filter video term T2 then policer video-policer service-filter-hit accept
set firewall filter video term default then accept
```

```
set firewall filter data term T1 from service-filter-hit
set firewall filter data term T1 then accept
set firewall filter data term T2 then policer data-policer service-filter-hit accept
```

Configuring the Voice Filter

Step-by-Step Procedure

To configure the voice filter for the logical flow in Figure 11 on page 540:

1. Configure the filter to apply the assured forwarding class and set the **service-filter-hit** action for traffic from a specific address and port range (over which voice traffic is expected).

   ```
   [edit]
   set firewall filter voice term T1 from address 1.1.1.1/32
   set firewall filter voice term T1 from source-port 5004-5005
   set firewall filter voice term T1 then forwarding-class assured-forwarding
     service-filter-hit accept
   ```

2. Configure the filter default action to pass (accept) packet traffic from any other address or port range.

   ```
   [edit]
   set firewall filter voice term default then accept
   ```

Configuring the Video Filter

Step-by-Step Procedure

To configure the video filter for the logical flow in Figure 11 on page 540:

1. Configure the filter to pass (accept) incoming packets that are tagged by the **service-filter-hit** action.

   ```
   [edit]
   set firewall filter video term T1 from service-filter-hit
   set firewall filter video term T1 then accept
   ```

2. Configure the filter to apply a video policer and set the **service-filter-hit** action for traffic from a specific address (over which video traffic is expected).

   ```
   [edit]
   set firewall filter video term T2 from source-address 10.10.10.10/32
   set firewall filter video term T2 then policer video-policer service-filter-hit accept
   ```

3. Configure the filter default action to pass (accept) packet traffic from any other address or port range.

   ```
   [edit]
   set firewall filter video term default then accept
   ```

Configuring the Data Filter

Step-by-Step Procedure

To configure the data filter for the logical flow in Figure 11 on page 540:

1. Configure the filter to pass (accept) incoming packets that are tagged by the **service-filter-hit** action.

   ```
   [edit]
   set firewall filter data term T1 from service-filter-hit
   set firewall filter data term T1 then accept
   ```

2. Configure the filter to apply a data policer and set the **service-filter-hit** action for traffic from a specific address (over which video traffic is expected).

```
[edit]
set firewall filter data term T2 then policer data-policer service-filter-hit accept
```

Results Display the results of the configuration:

```
[edit firewall]
user@host# show
filter voice {
  term T1 {
    from {
      address {
        1.1.1.1/32;
      }
      source-port 5004-5005;
    }
    then {
      forwarding-class assured-forwarding;
      service-filter-hit;
      accept;
    }
  }
  term default {
    then accept;
  }
}
filter video {
  term T1 {
    from {
      service-filter-hit;
    }
    then accept;
  }
  term T2 {
    from {
      source-address {
        10.10.10.10/32;
      }
    }
    then {
      policer video_policer;
      service-filter-hit;
      accept;
    }
  }
  term default {
    then accept;
  }
}
filter data {
  term T1 {
    from {
      service-filter-hit;
```

```
        }
        then accept;
      }
      term T2 {
        then {
          policer data_policer;
          service-filter-hit;
          accept;
        }
      }
    }
```

Related Documentation

- Classic Filters Overview on page 488
- Defining Dynamic Filter Processing Order on page 506
- Configuring Policers
- Configuring Firewall Filter Bypass on page 507

CHAPTER 50

Redirecting HTTP Requests Overview

Redirecting HTTP Requests

HTTP request traffic from subscribers is aggregated from access networks onto a Broadband and Remote Access Server (B-RAS) router, where HTTP traffic can be intercepted and redirected to a captive portal. A captive portal provides authentication and authorization services for redirected subscribers before granting access to protected servers outside of a walled garden. A walled garden defines a group of servers where access is provided to subscribers without reauthorization through a captive portal. You can use a captive portal page as the initial page a subscriber sees after logging in to a subscriber session and as a page used to receive and manage HTTP requests to unauthorized Web resources.

An HTTP redirect local server that resides locally on a router processes HTTP requests redirected to it and responds with a redirect URL to a captive portal. You can implement the local server as a service within a service set, which provides more scalability and better performance. An HTTP redirect remote server that resides in a walled garden behind routers processes HTTP requests redirected to it and responds with a redirect URL to a captive portal.

The HTTP redirect service implements a data handler and a control handler and registers them with service rules applicable to the HTTP applications. These rules are parsed by the security policy database (SPD) and pushed to Multiservices DPC. The data handler applies the rules to HTTP data flows and sends the flow to the control handler for further actions, such as rewriting the IP destination address or sending an HTTP 302 response with a preconfigured redirect URL. In addition, the control handler maintains a connection with authd on the routing engine to learn configuration changes, such as the redirect URL and the rewrite IP destination and port pair. To achieve faster performance, the control handler maintains a cache of relevant configured entities, such as URLs on Multiservices DPC.

Packet flow differs depending on the following configurations:

- Walled garden as a service filter—HTTP traffic destined to servers within the walled garden does not flow to Multiservices DPC. However, any HTTP traffic destined outside of the walled garden flows to the Multiservices DPC.

- Walled garden as an HTTP policy term—All HTTP traffic flows to the Multiservices DPC. The HTTP service handler determines if traffic is allowed to go to a walled garden.
- HTTP request packet—If the flow is destined to servers within the walled garden, no action is taken.

An HTTP redirect service can be attached to either a static or dynamic interface. For dynamic subscriber management, HTTP services can be attached dynamically at subscriber login or by using a change of authorizarion (CoA).

Related Documentation

- Configuring a Basic Dynamic Profile on page 349
- Configuring a Dynamic Profile for Various Levels of Services on page 355
- Junos Predefined Variables on page 328
- Associating Service Sets to Interfaces in a Dynamic Profile on page 527

CHAPTER 51

Configuring HTTP Redirect

Configuring HTTP Redirect Services

You can configure a walled garden with services and policies.

To configure the HTTP redirect service:

1. Configure the packet and installation.

```
[edit chassis]
fpc 1 {
  pic 0 {
    adaptive-services {
      service-package {
        extension-provider {
          control-cores 1;
          data-cores 7;
          object-cache-size 1024;
          policy-db-size 64;
          package jservices-cpcd;
          syslog {
            daemon any;
            external any;
          }
        }
      }
    }
  }
}
```

2. Configure the units and assign the VLAN IDs.

```
[edit interfaces]
ge-0/0/1 {
  vlan-tagging;
  unit 1 {
    vlan-id 100;
    family inet {
      address 100.20.1.1/24;
    }
```

```
    }
}
```

3. Configure the policy options.

```
policy-options {
    prefix-list google {
        74.125.19.0/24;
    }
}
```

4. Configure the service options.

```
firewall {
    family inet {
        service-filter walled {
            term google {
                from {
                    destination-prefix-list {
                        google;
                    }
                }
                then skip;
            }
            term http {
                from {
                    destination-port [ 80 8080 443 ];
                }
                then service;
            }
            term skip {
                then skip;
            }
        }
        service-filter fromSRC {
            term SRC {
                from {
                    source-address {
                        10.1.2.3/32;
                    }
                    source-port 8800;
                }
                then service;
            }
            term skip {
                then skip;
            }
        }
        service-filter test {
            term t1 {
                from {
                    protocol icmp;
                }
                then service;
            }
        }
    }
```

```
}
```

5. Configure the captive portal content delivery services.

```
services {
  captive-portal-content-delivery {
    rule test {
      match-direction input;
      term t1 {
        then {
          rewrite;
        }
      }
    }
    profile ipda-rewrite {
      cpcd-rules test;
      ipda-rewrite-options {
        destination-address 10.1.2.3;
        destination-port 8800;
      }
    }
    traceoptions {
      file cpcdd;
      flag all;
    }
  }
  service-set sset1 {
    captive-portal-content-delivery-profile ipda-rewrite;
    interface-service {
      service-interface ms-1/0/0;
    }
  }
  stateful-firewall {
    rule Rule1 {
      match-direction input-output;
      term 1 {
        from {
          applications [ junos-icmp-all junos-dhcp-server junos-tftp junos-http ];
        }
        then {
          accept;
        }
      }
      term 2 {
        from {
          applications SRC;
        }
        then {
          accept;
        }
      }
    }
  }
}
```

6. Configure the applications.

```
applications {
  application SRC {
    protocol tcp;
    destination-port 8800;
  }
}
```

Related Documentation

- Redirecting HTTP Requests on page 545

Verifying HTTP Redirect Requests

Purpose View information and statistics for the HTTP redirect configuration.

Action

- To display services statistics:

  user@host> **show services cpcd statistics**

- To display services flows:

  user@host> **show services cpcd flows**

- To clear services statistics:

  user@host> **clear services cpcd statistics**

CHAPTER 52

HTTP Redirect Examples

Example: Walled Garden as a Service Filter

Service filters are configured under the firewall and are not specific to captive portal content delivery. The following example shows a walled garden with one server, which is the captive portal:

```
[edit firewall family inet]
root@host# show
service-filter walled {
   term 1 {
      from {
         destination-address {
            100.20.2.3/32; ## this is the address of captive portal
         }
         destination-port 80;
      }
      then skip; ## skip service DPC for http traffic
      ## destined to captive portal
   }
}
```

The following example shows a walled garden within a subnet:

```
service-filter walled-net {
   term 2 {
      from {
         destination-prefix-list {
            100.20.2.0/24; ## '100.20.2.0/24' is not defined
         }
      }
      then skip;
   }
}
```

Example: Walled Garden as an HTTP Service Rule

HTTP service rule configuration resides under the services hierarchy and uses the captive portal and content delivery (cpcd) service. The following example shows a walled garden configured as an HTTP service rule:

```
[edit services captive-portal-content-delivery]
rule walled-garden {
   match-direction input-output
   term 1 {
      from {
         destination-address 100.20.2.3/32; ## captive portal
         destination-port 80;
      }
      then {
         accept;
      }
   }
}
```

When a remote HTTP redirect server is used, you need to configure an HTTP service rule to rewrite the IP-DA of incoming HTTP requests on the service router so that the requests reach the remote HTTP redirect server before being redirected to a captive portal. If the destination port is not specified, the default behavior is determined by the rewrite configuration. If no rewrite configuration is available, the destination port is not rewritten. The following example shows a configuration for IP-DA rewrite:

```
[edit services captive-portal-content-delivery]
rule ipda-rewrite {
   match-direction input-output;
   term 1 {
      from {
         applications junos-http;
      }
      then {
         rewrite destination-address 100.20.2.10; # this is the remote
         # redirect server.
      }
   }
}
```

Example: HTTP Service Within a Service Set

To become part of a service set, you must configure an HTTP service rule under a service set. In the following example, you can use http-service as an option in the service order configuration:

```
[edit services]
service-set http-redirect-walled {
   cpcd-rules walled-garden;
   cpcd-rules redirect;
}
```

You can also put rules in a rule set and then configure the service set as in the following example:

```
[edit services]
service-set http-redirect-walled {
   cpcd-rule-sets redirect-with-walled-garden;
}
```

Example: HTTP Service Attached to a Static Interface

The following example shows an HTTP service set attached to a static interface:

```
[edit interfaces ge-1/0/1]
root@hostr# show
unit 0 {
   family inet {
      service {
         input {
            service-set http-redirect-walled;
         }
         output {
            service-set http-redirect-walled;
         }
      }
      address 10.1.3.2/24;
   }
}
```

The following example uses a service filter as a walled garden by configuring the service set and then attaching it:

```
[edit services]
service-set http-redirect {
   cpcd-rules redirect;
}
```

```
[edit interfaces ge-1/0/1]
unit 0 {
   family inet {
      service {
         input {
            service-set http-redirect service-filter walled;
         }
         output {
            service-set http-redirect;
         }
      }
      address 10.1.3.2/24;
   }
}
```

Example: HTTP Service Attached to a Dynamic Interface

A dynamic service attachment uses a dynamic profile. In the following dynamic profile example, the name of the service set can be populated dynamically for each subscriber

at instantiation time. This dynamic profile encapsulates a service attachment point associated with a statically pre-provisioned service set sset-1.

```
dynamic-profiles {
   profile prof-2 { # parameterized service attachment
      interfaces {
         $junos-interface-ifd-name {
            unit $junos-interface-unit {
               family inet {
                  service {
                     input {
                        service-set $junos-service-set service-filter $junos-service-filter;
                        post-input-filter $junos-post-input-filter ;
                     }
                     output {
                        service-set $junos-service-set;
                     }
                  }
               }
            }
         }
      }
   }
}
```

To handle scalability more efficiently, in the following example the name of the service set can be populated dynamically for each subscriber at instantiation time.

```
dynamic-profiles {
   profile prof-2 { # parameterized service attachment
      interfaces {
         $junos-interface-ifd-name {
            unit $junos-interface-unit {
               family inet {
                  service {
                     input {
                        service-set $junos-service-set service-filter $junos-service-fileter;
                        post-input-filter $junos-post-input-filter ;
                     }
                     output {
                        service-set $junos-service-set;
                     }
                  }
               }
            }
         }
      }
   }
}
```

PART 13

Subscriber Secure Policy Traffic Mirroring

CHAPTER 53

Subscriber Secure Policy Overview

Subscriber Secure Policy Overview

Subscriber secure policy enables you to configure traffic mirroring on a per-subscriber basis. Subscriber secure policy mirroring can be based on information provided by either RADIUS or Dynamic Tasking Control Protocol (DTCP).

Configuration of subscriber secure policy mirroring is independent of the actual mirroring session—you can configure the mirroring parameters at any time. Also, you can use a single RADIUS or DTCP server to provision mirroring operations on multiple routers in a service provider's network. To provide security, the ability to configure, access, and view the subscriber secure policy components and configuration is restricted to authorized users.

Once subscriber secure policy is triggered, both the subscriber ingress and egress traffic are mirrored. The original traffic is sent to its intended destination and the mirrored traffic is sent to a mediation device for analysis. The actual mirroring operation is transparent to subscribers whose traffic is being mirrored. A special UDP/IP header is prepended to each mirrored packet sent to the mediation device. The prepended header is used as a demultiplexer, enabling the mediation device to differentiate the multiple mirrored streams that arrive from different sources.

NOTE: If both RADIUS-initiated and DTCP-initiated mirroring are configured for the same subscriber prior to login, the RADIUS-initiated configuration takes precedence. If both mirroring methods are configured for in-session mirroring, the first method that is triggered is used, and the other method is ignored.

Subscriber secure policy also supports the use of SNMPv3 traps to report mirroring information to an external device. The traps map to messages defined in the *Lawfully*

Authorized Electronic Surveillance (LAES) for IP Network Access, American National Standard for Telecommunications.

Traffic mirroring has many uses, such as debugging network problems, troubleshooting specific user issues, and lawful intercept. For example, you might use RADIUS-based mirroring when debugging network problems related to mobile users, who do not always log in to the same router. Subscriber secure policy mirroring is particularly useful for large networks, in which you can use a single RADIUS or DTCP server to provision the mirroring operation.

The following list provides information about RADIUS-initiated and DTCP-initiated mirroring::

- RADIUS-initiated mirroring creates secure policies based on certain RADIUS VSAs and uses RADIUS attributes to identify the subscriber whose traffic is to be mirrored. There are two variations of RADIUS-initiated mirroring. For both types, the mirroring operation is initiated without regard to the subscriber location, router, interface, or type of traffic.
  - Subscriber login—The mirroring operation starts when the subscriber logs in and the trigger is received in a RADIUS Access-Accept message. Using triggers in RADIUS Access-Accept messages enables you to mirror per-subscriber traffic without regard to how often the subscriber logs in or out, or which router or interface the subscriber uses.
  - In-session—The mirroring operation starts when the trigger is received in a RADIUS Change-of-Authorization-Request (CoA-Request) message. Using triggers in CoA messages enables you to immediately mirror traffic of a subscriber who is already logged in.
- DTCP-initiated mirroring creates secure policies based on DTCP attributes to mirror traffic for the subscriber. The attributes in a DTCP ADD message trigger the router to start mirroring traffic and specify the interface on which the mirroring takes place. The following list describes the types of DTCP-initiated mirroring:
  - Subscriber login—If the DTCP ADD message with the trigger has been previously received, the subscriber traffic on the specified interface is then mirrored when the subscriber logs in.
  - In-session—If the subscriber is already logged in, the mirroring operation starts when the trigger is received in the DTCP ADD message.

Subscriber Secure Policy Terms

Table 50 on page 558 defines terms that are used in the discussion of subscriber secure policy.

Table 50: Subscriber Secure Policy Terms

Term	Definition
DTCP	Dynamic Tasking Control Protocol.

Table 50: Subscriber Secure Policy Terms *(continued)*

Term	Definition
Intercept access point	Device that requests and configures the subscriber secure policy service. The Juniper Networks router performs this function.
Mediation device	Location to which the mirrored traffic is sent. Also called an analyzer device.
Mirrored subscriber	Subscriber whose traffic is mirrored.
Mirror trigger	RADIUS or DTCP attribute that identifies a subscriber whose traffic is to be mirrored. Mirroring starts when the trigger is detected.
Requesting authority	Authorized group that requests or conducts traffic mirroring.
Salt encryption	Random string of data used to modify a password hash. The mirroring VSAs sent to the router by the RADIUS server are Salt-encrypted.
Target system	System on which the subscriber secure policy service (and the radius-flow-tap service) is configured.

Related Documentation

- Subscriber Secure Policy Traffic Mirroring Architecture on page 560
- RADIUS Attributes Used for Subscriber Secure Policy on page 568
- Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 567
- SNMP Traps for Subscriber Secure Policy LAES Compliance on page 577
- Subscriber Secure Policy Licensing Requirements on page 560

Subscriber Secure Policy and L2TP LAC Subscribers

RADIUS-initiated per-subscriber traffic mirroring can be applied to subscribers whose traffic is tunneled with L2TP. Both subscriber ingress traffic (from the subscriber into the tunnel) and subscriber egress traffic (from the tunnel to the subscriber) are mirrored at the (subscriber-facing) ingress interface on the LAC. The ingress traffic is mirrored after PPPoE decapsulation and before L2TP encapsulation. The egress traffic is mirrored after L2TP decapsulation. The mirrored packet includes the complete HDLC frame sent to the LNS rather than only the IP datagram.

Related Documentation

- Subscriber Secure Policy Overview on page 557
- Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 567
- RADIUS Attributes Used for Subscriber Secure Policy on page 568

Subscriber Secure Policy Licensing Requirements

To enable and use subscriber secure policy, you must install and properly configure the Subscriber Secure Policy license.

Related Documentation

- For information about installing and managing Junos licenses, see the "Installing and Managing Junos Licenses" chapter of the *Junos OS Installation and Upgrade Guide*

Subscriber Secure Policy Traffic Mirroring Architecture

This topic describes the subscriber secure policy architecture and includes a description of how mirrored traffic flows within the subscriber secure policy environment.

Figure 12 on page 560 illustrates the RADIUS-initiated subscriber secure policy mirroring environment (in DTCP-initiated mirroring, the DTCP client performs the mirroring-related operations shown for the RADIUS server in the figure).

The Juniper Networks router, functioning as an intercept access point, is the center piece of the subscriber secure policy architecture. The figure indicates the sequence of events that are performed to configure mirroring operations and the traffic flow that occurs during mirroring. The tables after the figure describe the events indicated by the figure. Table 51 on page 561 describes the configuration sequence. Table 52 on page 561 and Table 53 on page 561 describe the sequence of events that occur during mirroring operations.

Figure 12: RADIUS-Initiated Subscriber Secure Policy Architecture

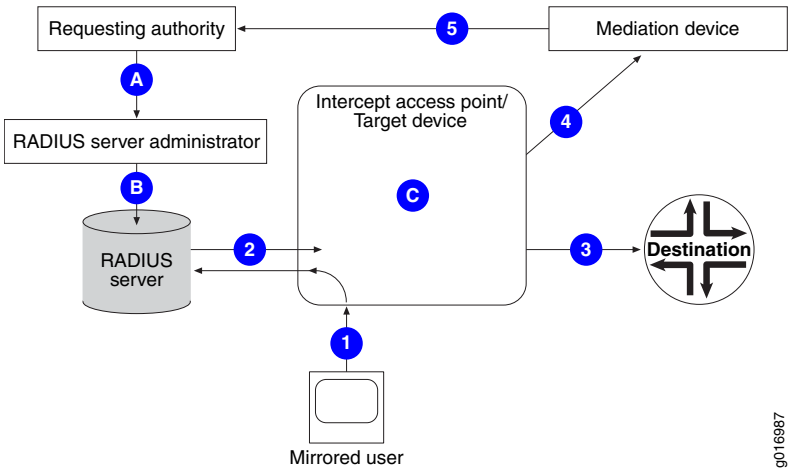


Table 51 on page 561 lists the high-level steps that are required to configure the subscriber secure policy traffic mirroring environment.

Table 51: Subscriber Secure Policy Configuration Steps

Step	Description
A	An authorized individual or group requests traffic mirroring. This group also ensures that the mediation device is configured to receive and analyze mirrored traffic.
B	• For RADIUS-initiated mirroring, the RADIUS server administrator configures the subscriber RADIUS record to include the mirroring-related RADIUS attributes and VSAs. • For DTCP-initiated mirroring, the DTCP server administrator configures the DTCP ADD message to include the DTCP mirroring-related attributes.
C	The Juniper Networks router administrator configures the subscriber secure policy service on the router, including the radius-flow-tap service configuration, RADIUS or DTCP server information, and mediation device information.

RADIUS-Initiated Traffic Mirroring Process

Table 52 on page 561 shows the process for a RADIUS-initiated subscriber login mirroring operation, which is initiated when the mirrored subscriber logs in. Table 53 on page 561 shows the procedure for a RADIUS-initiated in-session mirroring operation, in which the subscriber is already logged in.

Table 52: RADIUS-Initiated Mirroring at Subscriber Login

Step	Description
1	The subscriber logs in, requesting authentication by the RADIUS server.
2	• The RADIUS server authenticates the subscriber and sends an Access-Accept message containing the mirroring-related RADIUS attributes and VSAs to the router (intercept access point). • The mirroring trigger in the RADIUS Access-Accept message initiates the mirroring operation. • The intercept access point creates the subscriber secure policy based on the mirroring VSAs and begins mirroring the subscriber's traffic.
3	The intercept access point sends the original subscriber traffic to its intended destination.
4	The intercept access point sends the mirrored subscriber traffic to the mediation device.
5	The mediation device provides information about the mirrored traffic to the requesting authority.

Table 53: RADIUS-Initiated Mirroring for Current Subscriber

Step	Description
1	The subscriber logs in, requesting authentication by the RADIUS server. The RADIUS server authenticates the subscriber (no mirroring activity occurs).

Table 53: RADIUS-Initiated Mirroring for Current Subscriber *(continued)*

Step	Description
2	• Subscriber-based mirroring is later requested by the requesting authority and then enabled on the RADIUS server. • The RADIUS server sends a CoA message containing the mirroring-related RADIUS attributes and VSAs to the router (intercept access point). • The mirroring trigger in the RADIUS CoA message initiates the mirroring operation. • The intercept access point creates the subscriber secure policy based on the mirroring VSAs and immediately begins mirroring subscriber traffic.
3	The intercept access point sends the original subscriber traffic to its intended destination.
4	The intercept access point sends the mirrored subscriber traffic to the mediation device.
5	The mediation device provides information about the mirrored traffic to the requesting authority.

DTCP-Initiated Traffic Mirroring Process

Table 54 on page 562 shows the process for a DTCP-initiated mirroring operation.

Table 54: DTCP-Initiated Traffic Mirroring

Step	Description

1	• The DTCP client sends the ADD message containing the mirroring-related attributes to the router, which functions as the intercept access point and the DTCP server.
	  ◦ If the DTCP ADD is received before the subscriber logs on, the traffic mirroring begins when the subscriber subsequently logs on.
	  ◦ If the DTCP ADD is received after the subscriber has logged on, the traffic mirroring begins when the ADD is received.
	• The intercept access point creates the subscriber secure policy based on the mirroring attributes, then begins mirroring traffic for subscribers currently logged on, and will mirror traffic for subscribers that log on in the future.

2	The intercept access point sends the original subscriber traffic to its intended destination.
3	The intercept access point sends the mirrored subscriber traffic to the mediation device.
4	The mediation device provides information about the mirrored traffic to the requesting authority.

Related Documentation

- Subscriber Secure Policy Overview on page 557
- Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 567

CHAPTER 54

Configuring RADIUS-Flow-Tap Service Support for Subscriber Secure Policy Mirroring

Guidelines for Configuring Subscriber Secure Policy Mirroring on the RADIUS-Flow-Tap Service

The subscriber secure policy service runs on the radius-flow-tap service infrastructure. When configuring subscriber secure policy mirroring, consider the following guidelines regarding the relationship between subscriber secure policy service and the radius-flow-tap service:

- Subscriber secure policy inherits the limitations of the flow-tap service. For example, the radius-flow-tap service and the flow-tap service cannot run simultaneously on the router. Therefore, port mirroring and subscriber secure policy mirroring cannot run simultaneously on the same router.
- You can configure one instance of the radius-flow-tap service on the router. Both subscriber secure policy RADIUS-initiated mirroring and DTCP-initiated mirroring use the radius-flow-tap service.
- If you configure both RADIUS-initiated mirroring and DTCP-initiated mirroring, and the two mirroring requests are the same, duplicate mirrored traffic is sent to the mediation device.
- You cannot delete the radius-flow-tap service configuration while a subscriber secure policy mirroring session is active on the service.

Related Documentation

- Subscriber Secure Policy Overview on page 557
- Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 567
- Configuring RADIUS-Flow-Tap Service Support for Subscriber Secure Policy Mirroring on page 564

Configuring RADIUS-Flow-Tap Service Support for Subscriber Secure Policy Mirroring

Subscriber secure policy runs on the radius-flow-tap service. This topic describes the steps to configure radius-flow-tap support for RADIUS-initiated and DTCP-initiated subscriber secure policy mirroring.

To configure the radius-flow-tap service to support subscriber secure policy mirroring:

1. Allocate a pool of tunnel interfaces for the radius-flow-tap service to use for subscriber secure policy mirroring. The intercept access point uses these interfaces to send mirrored traffic to the mediation device. The intercept access point equally distributes the mirrored traffic across the available tunnel interfaces.

   You can configure a maximum of 2048 mirrored subscriber sessions per chassis.

   ```
   [edit chassis]
   user@host# set fpc slot–number pic number tunnel-services bandwidth bandwidth
   ```

2. Configure the tunnel interfaces.

   ```
   [edit interfaces]
   user@host# set interface-name
   ```

3. Assign the tunnel interfaces that the radius-flow-tap service uses for subscriber secure policy mirroring.

   ```
   [edit services]
   user@host# set radius-flow-tap interfaces interface-name
   ```

   NOTE: If a currently used tunnel interface is deleted from the pool of interfaces, the subscriber secure policy service redistributes the active mirroring sessions from the deleted interface to other tunnel interfaces in the pool. Also, when a new tunnel interface is added into the pool, the service adds the new interface to the list of available interfaces—the new interface is used for new mirroring sessions or for existing sessions transferred from a failed interface.

4. Specify the source IP address that the radius-flow-tap service uses for mirroring. This address is used in the IP header prepended to mirrored packets that are sent to the content destination device.

   ```
   [edit services]
   user@host# set radius-flow-tap source-ipv4-address ipv4-address
   ```

5. (Optional) Specify the forwarding class that is applied to the mirrored packets sent to the mediation device.

   If you do not specify a forwarding class, the mirrored packets inherit the forwarding class from the original packet (which is the forwarding class set by default classification that CoS applies to the packet on the ingress interface).

   ```
   [edit services]
   user@host# set radius-flow-tap forwarding-class class-name
   ```

Related Documentation

- Subscriber Secure Policy Overview on page 557
- Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 567
- Configuring DTCP-Initiated Subscriber Secure Policy Mirroring Overview on page 573
- Guidelines for Configuring Subscriber Secure Policy Mirroring on the RADIUS-Flow-Tap Service on page 563

CHAPTER 55

Configuring RADIUS-Initiated Subscriber Secure Policy Traffic Mirroring

Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview

You can configure RADIUS-initiated subscriber secure policy mirroring to mirror the traffic of a particular subscriber.

NOTE: Subscriber secure policy RADIUS-initiated mirroring runs on the radius-flow-tap service infrastructure. To configure the subscriber secure policy service, you must have the same privileges that are required to configure the radius-flow-tap service.

To configure the subscriber secure policy service:

1. Configure the radius-flow-tap service support for secure subscriber policy. This support includes configuring the tunnels and optional forwarding-class information that the subscriber secure policy service uses to send mirrored traffic to the content destination device.

   See "Configuring RADIUS-Flow-Tap Service Support for Subscriber Secure Policy Mirroring" on page 564.

2. Configure an access profile that specifies the RADIUS-related support for subscriber secure policy on the router, including a list of one or more RADIUS authentication servers. The router uses the list of specified servers for both authentication and dynamic request operations. You must also configure the RADIUS dynamic request feature, which provides the CoA message support used in-session traffic mirroring.

   See "Configuring RADIUS Server Support for Subscriber Secure Policy Mirroring" on page 571.

   See "Using RADIUS Dynamic Requests for Subscriber Access Management" on page 34.

3. Ensure that the following support is also configured:

   - The RADIUS record of the mirrored subscriber must include the RADIUS attributes and VSAs required for subscriber secure policy mirroring. See “RADIUS Attributes Used for Subscriber Secure Policy” on page 568 for descriptions of the supported attributes used in RADIUS Accept-Accept and CoA messages.
   - The content destination device must be configured to accept the mirrored data from the mediation device.

   The descriptions of these configurations are beyond the scope of this document.

4. (Optional) Configure SNMPv3 trap support to report mirroring information to an external device.

   See “Configuring SNMPv3 Traps for Subscriber Secure Policy Mirroring” on page 578.

5. You can terminate an active subscriber mirroring session at any time.

   See “Terminating Subscriber Secure Policy Mirroring Sessions” on page 571.

NOTE: The subscriber secure policy feature requires some system resources while mirroring, encrypting, and sending traffic to the mediation device. We recommend that you consider this requirement when you configure subscriber secure policy. For example, you might elect to use a 10-Gigabit Ethernet interface for the tunnel and mediation device if you expect the amount of traffic you plan to mirror to approach 1 Gbps of actual user data.

Related Documentation

- RADIUS Attributes Used for Subscriber Secure Policy on page 568
- Subscriber Secure Policy Mirroring and SNMP Traps on page 577
- Terminating Subscriber Secure Policy Mirroring Sessions on page 571
- Example: Subscriber Secure Policy Mirroring Using RADIUS on page 581

RADIUS Attributes Used for Subscriber Secure Policy

Subscriber secure policy mirroring triggers are RADIUS attributes that identify a subscriber whose traffic is to be mirrored. The actual traffic mirroring session starts when the router (intercept access point) receives a RADIUS packet that contains a trigger and then applies the subscriber secure policy configuration to the appropriate interface.

The router receives subscriber secure policy triggers in the following types of RADIUS messages:

- RADIUS Access-Accept—Used to start a mirroring session when the specified subscriber logs in.
- RADIUS Change-of-Authorization-Request (CoA-Request)—Used to immediately begin mirroring traffic of the specified subscriber, who is already logged in.

Table 55 on page 569 lists the mirroring triggers that the RADIUS server administrator adds to the RADIUS record of the subscriber whose traffic is to be mirrored. In addition, the RADIUS VSAs listed in Table 56 on page 569 must be included in the mirrored subscriber's RADIUS record.

RADIUS Attributes Used as Traffic Mirroring Triggers

Table 55 on page 569 lists the subscriber secure policy mirroring triggers (RADIUS attributes) that can be present in RADIUS Access-Accept and CoA messages. The attributes identify the subscriber whose traffic is to be mirrored.

Table 55: RADIUS Attributes Used as Traffic Mirroring Triggers

Attribute Number	Attribute Name
[1]	User-Name
[8]	Framed-IP-Address
[31]	Calling-Station-ID
[44]	Acct-Session-ID
[87]	Nas-Port-ID

RADIUS-Based Mirroring Attributes

Table 56 on page 569 lists the RADIUS VSAs that you must include in the RADIUS record of the subscriber whose traffic is to be mirrored. The VSAs carry mirroring-related information.

The AAA Service Framework uses vendor ID 4874, which is assigned to Juniper Networks by the Internet Assigned Numbers Authority (IANA).

Table 56: RADIUS-Based Mirroring Attributes

Attribute Number	Attribute Name	Description	Value
[26-58]	LI-Action	Traffic mirroring action	• 0 = stop mirroring • 1 = start mirroring • 2 = no action
[26-59]	Med-Dev-Handle	Link to which traffic mirroring is applied	Salt-encrypted string
[26-60]	MD-Ip-Address	IP address of mediation device to which mirrored traffic is forwarded	Salt-encrypted IP address

Table 56: RADIUS-Based Mirroring Attributes *(continued)*

Attribute Number	Attribute Name	Description	Value
[26-61]	MD-Port-Number	UDP port in the mediation device to which mirrored traffic is forwarded	Salt-encrypted integer

Considerations When Using RADIUS Attributes for Subscriber Secure Policy

When using RADIUS attributes and VSAs for the subscriber secure policy service, keep the following considerations in mind:

- A dynamic profile must exist for a subscriber whose traffic is to be mirrored. Otherwise, the subscriber is unable to log in when the mirroring-related VSAs are received in RADIUS Accept-Accept or CoA messages. See "Dynamic Profiles Overview" on page 325 for information about dynamic profiles.
- VSA 26-60 must always be present in the RADIUS Access-Accept or CoA message, or the instantiation of the mirroring session will fail. The presence of VSA 26-60 triggers the prepending operation—all mirrored packets must be prepended with both the UDP/IP header and the MD header.
- VSA 26–58 (LI-Action) specifies the action taken by the router. The action differs if the VSA is received in an Access-Accept message or a CoA message, as indicated in Table 57 on page 570.

Table 57: LI-Action VSA Action

LI-Action Value	Access-Accept Message Action	CoA Message Action
0	Prevents subscriber from logging in	Immediately stops mirroring subscriber traffic; subscriber remains logged in
1	Starts mirroring subscriber traffic when subscriber logs in	Immediately starts mirroring subscriber traffic
2	No action	No action

- A VSA 26–58 value of 2 specifies that the router does not perform any traffic mirroring-related action. This setting can provide additional security by confusing unauthorized users who attempt to access traffic mirroring communication between the router and the RADIUS server.

Related Documentation

- Subscriber Secure Policy Overview on page 557
- Subscriber Secure Policy Traffic Mirroring Architecture on page 560
- Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 567
- Dynamic Profiles Overview on page 325
- Example: Subscriber Secure Policy Mirroring Using RADIUS on page 581

- Example: Subscriber Secure Policy Dynamic Profile on page 361

Configuring RADIUS Server Support for Subscriber Secure Policy Mirroring

This topic describes how to configure RADIUS server support for the subscriber secure policy service. The RADIUS server can then initiate subscriber-based traffic mirroring. You create an access profile to specify the RADIUS server support.

To configure the router's interaction with the RADIUS server in support of subscriber secure policy mirroring:

1. Create the access profile and assign a name.

   [edit access]
   user@host# **edit profile** ***profile-name***

2. Specify RADIUS as the authentication method.

   [edit access profile *profile-name*]
   user@host# **set authentication-order radius**

3. Specify the IP address of the RADIUS server that performs authentication. This server also performs dynamic request (CoA) functions.

   [edit access profile *profile-name*]
   user@host# **set radius authentication-server** ***ip-address***

4. Specify the secret to use when communicating with the RADIUS server.

   [edit access profile *profile-name*]
   user@host# **set radius-server** ***server-address*** **secret** ***password***

5. Specify other optional RADIUS configuration settings as needed, such as accounting support.

Related Documentation

- Subscriber Secure Policy Overview on page 557
- Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 567
- RADIUS Attributes Used for Subscriber Secure Policy on page 568

Terminating Subscriber Secure Policy Mirroring Sessions

This topic describes how subscriber secure policy mirroring operations are terminated.

Mirroring sessions are terminated by the following actions:

- RADIUS CoA message receipt—RADIUS-initiated mirroring is terminated upon receipt of a CoA message with the VSA 26-58 (LI-Action) value of 0. The RADIUS administrator configures the LI-Action of 0 in the mirrored subscriber's RADIUS record.
- DTCP DELETE message receipt—DTCP-initiated mirroring is terminated upon receipt of a DTCP DELETE message. The DTCP administrator configures the DELETE message to include the same mirroring attributes that are used in the ADD message to initiate mirroring.

- Subscriber logout—Both RADIUS and DTCP mirroring for a subscriber are terminated when the mirrored subscriber logs out.
- Session timeout—Both RADIUS and DTCP mirroring for a subscriber are terminated when the current subscriber session times out.
- Session disconnect—Both RADIUS and DTCP mirroring for a subscriber are terminated when the current subscriber session is disconnected.

Related Documentation

- Subscriber Secure Policy Overview on page 557
- Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 567
- RADIUS Attributes Used for Subscriber Secure Policy on page 568
- Configuring DTCP-Initiated Subscriber Secure Policy Mirroring Overview on page 573
- DTCP Attributes Used for Subscriber Secure Policy on page 576

CHAPTER 56

Configuring DTCP-Initiated Subscriber Secure Policy Mirroring

Configuring DTCP-Initiated Subscriber Secure Policy Mirroring Overview

You can configure DTCP-initiated subscriber secure policy mirroring to mirror subscriber traffic.

NOTE: DTCP-initiated subscriber secure policy mirroring runs on the radius-flow-tap service infrastructure. To configure the subscriber secure policy service, you must have the same privileges that are required to configure the radius-flow-tap service.

To configure DTCP-initiated subscriber secure policy service:

1. Configure the radius-flow-tap service support for secure subscriber policy. This support includes configuring the tunnels and optional forwarding-class information that the subscriber secure policy service uses to send mirrored traffic to the content destination device.

   See “Configuring RADIUS-Flow-Tap Service Support for Subscriber Secure Policy Mirroring” on page 564.

2. Configure the DTCP support for subscriber secure policy. This support includes configuring the DTCP-over-SSH service that provides an extra level of security for DTCP transactions.

   See “Configuring DTCP Support for Subscriber Secure Policy Mirroring” on page 574.

3. Ensure that the following support is also configured:

   - The DTCP ADD message of the mirrored interface must include the DTCP attributes required for subscriber secure policy mirroring. See “DTCP Attributes Used for

Subscriber Secure Policy” on page 576 for descriptions of the supported attributes used in DTCP messages.

- The content destination device must be configured to accept the mirrored data from the mediation device.

The descriptions of these configurations are beyond the scope of this document.

4. (Optional) Configure SNMPv3 trap support to capture and report mirroring information to an external device.

   See “Configuring SNMPv3 Traps for Subscriber Secure Policy Mirroring” on page 578.

5. You can terminate an active subscriber mirroring session at any time.

   See “Terminating Subscriber Secure Policy Mirroring Sessions” on page 571.

NOTE: The subscriber secure policy feature requires some system resources while mirroring, encrypting, and sending traffic to the mediation device. We recommend that you consider this requirement when you configure subscriber secure policy. For example, you might elect to use a 10-Gigabit Ethernet interface for the tunnel and mediation device if you expect the amount of traffic you plan to mirror to approach 1 Gbps of actual user data.

Related Documentation

- DTCP Attributes Used for Subscriber Secure Policy on page 576
- Subscriber Secure Policy Mirroring and SNMP Traps on page 577
- Terminating Subscriber Secure Policy Mirroring Sessions on page 571
- Example: Subscriber Secure Policy Mirroring Using DTCP on page 583

Configuring DTCP Support for Subscriber Secure Policy Mirroring

This topic describes the steps to enable DTCP support for subscriber secure policy mirroring. The DTCP-initiated subscriber secure policy feature requires that you configure the DTCP-over-SSH feature for the radius-flow-tap service.

To enable the DTCP-over-SSH flow-tap service to support subscriber secure policy mirroring:

1. Create the login class and configure **flow-tap-operation** permissions for the class.

   a. At the **[edit system]** hierarchy level, specify that you want to configure login properties.

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

   b. Create and name the class.

      ```
      [edit system login]
      user@host# edit class class-name
      ```

c. Configure the **flow-tap-operation** permission for the class.

```
[edit system login class class-name]
user@host# set permissions flow-tap-operation
```

2. Create the user login account for the subscriber whose traffic will be mirrored.

   a. At the **[edit system login]** hierarchy, create the user account.

   ```
   [edit system login]
   user@host# edit user username
   ```

   b. Configure the user ID.

   ```
   [edit system login user username]
   user@host# set uid uid-value
   ```

   c. Configure the class for the user account.

   ```
   [edit system login user username]
   user@host# set class class-name
   ```

   d. Configure the authentication for the user account.

   ```
   [edit system login user username]
   user@host# set authentication encrypted-password password
   ```

3. Configure DTCP sessions to run over SSH in support of the flow-tap service.

   a. At the **[edit system services]** hierarchy, configure the flow-tap-dtcp service.

   ```
   [edit system services]
   user@host# edit flow-tap-dtcp
   ```

   b. Configure SSH support for DTCP.

   ```
   [edit system services flow-tap-dtcp]
   user@host# set ssh
   ```

   c. (Optional) Configure maximum number of established connections allowed for the DTCP service.

   ```
   [edit system services flow-tap-service ssh]
   user@host# set connection-limit limit
   ```

   d. (Optional) Configure the maximum number of connection attempts allowed per minute for DTCP.

   ```
   [edit system services flow-tap-service ssh]
   user@host# set rate-limit limit
   ```

Related Documentation

- Subscriber Secure Policy Overview on page 557
- Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 567
- Configuring DTCP-Initiated Subscriber Secure Policy Mirroring Overview on page 573
- Terminating Subscriber Secure Policy Mirroring Sessions on page 571
- Configuring DTCP-over-SSH Service for the Flow-Tap Application
- Example: Subscriber Secure Policy Mirroring Using DTCP on page 583

DTCP Attributes Used for Subscriber Secure Policy

DTCP-initiated subscriber secure policy mirroring is triggered by a DTCP attribute that identifies the subscriber interface on which traffic is to be mirrored. The traffic mirroring session starts when the router (intercept access point) receives a DTCP ADD message that contains the trigger and other DTCP attributes that provide mirroring-related information, and then applies the subscriber secure policy configuration to the appropriate interface. The DTCP ADD message can be sent either before or after subscribers log on through the interface.

Table 58 on page 576 lists the mirroring trigger and the other DTCP attributes that the DTCP server administrator must include in the DTCP ADD message.

DTCP Traffic Mirroring Attributes

Table 58 on page 576 lists the DTCP attributes that trigger traffic mirroring and provide mirroring-related information.

Table 58: DTCP Mirroring Attributes

Attribute Name	DTCP Message Semantic	Description
Interface-ID	X-Interface-Id	The mirroring trigger. The interface description string on which traffic mirroring is performed (for example, **ge-0/0/0.1** or **demux0.107472834**).
Mediation Device IP Address	X-JTap-Cdest-Source-Address	IPv4 address of the mediation device to which the router sends intercepted traffic.
Mediation Device UDP Port	X-JTap-Cdest-Port	UDP port of the mediation device.
Intercept ID (also known as the Mirror ID)	X-MD-Intercept-Id	Identifier that the mediation device uses to correlate traffic from a particular subscriber.

CHAPTER 57

Subscriber Secure Policy Mirroring and SNMP Traps

Subscriber Secure Policy Mirroring and SNMP Traps

Subscriber secure policy supports the use of SNMPv3 traps to report traffic mirroring information. Using SNMPv3 provides secure traps that are visible only to authorized individuals on the intended secure mediation device. The traps help support compliance with the Communications Assistance for Law Enforcement Act (CALEA), which defines electronic surveillance guidelines for telecommunications companies.

The supported SNMPv3 traps map to messages defined by the *Lawfully Authorized Electronic Surveillance (LAES) for IP Network Access, American Nation Standard For Telecommunications*. "SNMP Traps for Subscriber Secure Policy LAES Compliance" on page 577 describes the supported SNMPv3 traps and their related LAES messages.

Related Documentation

- Subscriber Secure Policy Overview on page 557
- Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 567
- SNMP Traps for Subscriber Secure Policy LAES Compliance on page 577
- Example: SNMPv3 Traps Configuration for Subscriber Secure Policy Mirroring on page 587

SNMP Traps for Subscriber Secure Policy LAES Compliance

Table 59 on page 578 describes the SNMPv3 traps that subscriber secure policy mirroring uses to provide information that maps to messages defined in the *Lawfully Authorized Electronic Surveillance (LAES) for IP Network Access, American National Standard for Telecommunications*. These messages enable subscriber secure policy to comply with the *Communications Assistance for Law Enforcement Act* (CALEA). The Juniper Packet Mirroring MIB, **jnx-js-packet-mirror.mib** provides the SNMP trap.

Table 59: Subscriber Secure Policy SNMPv3 Traps for LAES Messages

SNMPv3 Trap	LAES Message	Description
jnxPacketMirrorLiSubscriberLoggedIn	• **access-attempt** (implied) • **access-session-accept** • **packet-data-session-start**	A subscriber, who is identified to have a mirrored service that is activated at login, has successfully logged in.
jnxPacketMirrorSessionLiSubscriberLogInFailed	• **access-attempt** (implied) • **access-failed** (all termination reasons except authentication-reject) • **access-reject** (termination reason is authentication-reject)	A subscriber, who is identified to have a mirrored service that is activated at login, has failed to log in.
jnxPacketMirrorInterfaceLiSubscriberLoggedOut	• **access-session-end** • **packet-data-session-end**	A subscriber, who had an active mirrored service, has logged out.
jnxPacketMirrorInterfaceLiServiceActivated	• **packet-data-session-already-established**	A mirrored session has been activated.
jnxPacketMirrorSessionLiServiceActivationFailed	–	A mirrored session for a subscriber has failed.
jnxPacketMirrorSessionLiServiceDeactivated	–	A mirrored session for an established subscriber has been deactivated.
jnxPacketMirrorMirroringFailure	–	A mirrored service request failed due to an invalid value in the request. Note: This trap is not related to LAES messages.

Configuring SNMPv3 Traps for Subscriber Secure Policy Mirroring

This topic provides an overview of the SNMPv3 configuration process as it pertains to subscriber secure policy. The steps are described in detail in Chapter 7, “Configuring SNMPv3” in the *Junos Network Management Configuration Guide*.

To configure SNMPv3 trap support for subscriber secure policy and to send the trap information to the mediation device:

1. Configure the MIB view.

   See Configuring MIB Views.

2. Configure the trap notification and trap notification filter. See the following topics:

   - Configuring the SNMPv3 Trap Notification
   - Configuring the Trap Notification Filter

3. Configure the target device. The target device is the mediation device that receives the trap information.

   See Configuring SNMPv3 Traps on a Device Running Junos OS.

4. Configure the SNMPv3 user, authentication method and password, and privacy method and password. See the following topics:

   - Creating SNMPv3 Users
   - Configuring the SNMPv3 Authentication Type
   - Configuring the Encryption Type

5. Configure user access privileges to management information.

   See Defining Access Privileges for an SNMP Group.

Related Documentation

- Subscriber Secure Policy Overview on page 557
- Example: SNMPv3 Traps Configuration for Subscriber Secure Policy Mirroring on page 587
- For information about SNMPv3, see the *Junos Network Management Configuration Guide*

CHAPTER 58

Subscriber Secure Policy Mirroring Examples

Example: Subscriber Secure Policy Mirroring Using RADIUS

This example shows a subscriber secure policy mirroring configuration that uses RADIUS. The configuration captures and sends information for a subscriber to a mediation device defined on the RADIUS server.

```
system {
  ports {
    console log-out-on-disconnect;
  }
  services {
    dhcp-local-server {
      pool-match-order {
        external-authority;
        ip-address-first;
        option-82;
      }
      authentication {
        password myPassword;
        username-include {
          user-prefix BSMITH;
        }
      }
      group southwest25 {
        interface ge-1/0/0.100;
      }
    }
  }
}
interfaces {
  ge-1/0/0 {
    flexible-vlan-tagging;
```

```
    unit 100 {
      proxy-arp;
      vlan-id 100;
      family inet {
        unnumbered-address lo0.0 preferred-source-address
        192.168.25.2;
      }
    }
  }
  lo0 {
    unit 0 {
      family inet {
        address 192.168.25.2/32;
      }
    }
  }
}
snmp {
  community oslo {
    authorization read-only;
    clients {
      192.168.35.225/32;
    }
  }
  trap-group oslo {
    version v2;
    targets {
      192.168.35.225;
    }
  }
}
access {
  radius-server {
    192.168.11.178 secret " myRadiusSecret-1";
    192.168.35.225 {
      port 1812;
      secret "myRadiusSecret-2";
    }
  }
  profile myProf1 {
    authentication-order radius;
    radius {
      authentication-server 192.168.35.225;
      accounting-server 192.168.11.178;
    }
  }
  address-assignment {
    pool poolA {
      family inet {
        network 192.168.42.0/8;
        range limited {
          low 192.168.42.10;
          high 192.168.42.254;
        }
      }
    }
```

```
    }
  }
  chassis {
    fpc 1 {
      pic 1 {
        tunnel-services {
          bandwidth 1g;
        }
      }
    }
  }
  services {
    radius-flow-tap {
      traceoptions {
        file myFile-20;
      }
      source-ipv4-address 192.168.200.1;
      interfaces {
        vt-1/1/10.0;
      }
    }
  }
access-profile myProf1;
```

Related Documentation

- Subscriber Secure Policy Overview on page 557
- Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 567

Example: Subscriber Secure Policy Mirroring Using DTCP

This example shows a subscriber secure policy mirroring configuration that uses DTCP. The configuration captures and sends information for a subscriber and to a mediation device defined on the DTCP server.

```
system {
  ports {
    console log-out-on-disconnect;
  }
  login {
    class ft-class {
      permissions flow-tap-operation;
    }
    user ft-user1 {
      uid 2000;
      class ft-class;
      authentication {
        encrypted-password
        "yourSecret";
      }
    }
  }
  services {
    flow-tap-dtcp {
      ssh;
```

```
        }
        dhcp-local-server {
            pool-match-order {
                external-authority;
                ip-address-first;
                option-82;
            }
            authentication {
                password myPassword;
                username-include {
                    user-prefix JDOE;
                }
            }
            group northeast42 {
                interface ge-1/0/0.100;
            }
        }
    }
}
chassis {
    fpc 0 {
        pic 1 {
            tunnel-services {
                bandwidth 1g;
            }
        }
    }
}
interfaces {
    ge-1/0/0 {
        flexible-vlan-tagging;
        unit 100 {
            proxy-arp;
            vlan-id 100;
            family inet {
                unnumbered-address lo0.0 preferred-source-address
                192.168.22.2;
            }
        }
    }
    lo0 {
        unit 0 {
            family inet {
                address 192.168.22.2/32;
            }
        }
    }
}
snmp {
    community madrid {
        authorization read-only;
        clients {
            192.168.30.225/32;
        }
    }
    trap-group madrid {
```

```
        version v2;
        targets {
          192.168.30.225;
        }
      }
    }
    access {
      radius-server {
        192.1168.11.178 secret "yourRadiusSecret-1";
        SECRET-DATA
        192.168.30.225 {
          port 1812;
          secret "yourRadiusSecret-2";
        }
      }
      profile myProf2 {
        authentication-order radius;
        radius {
          authentication-server 192.168.30.225;
          accounting-server 192.168.11.178;
        }
      }
      address-assignment {
        pool poolA {
          family inet {
            network 192.168.22.0/8;
            range limited {
              low 192.168.22.10;
              high 192.168.22.254;
            }
          }
        }
      }
    }
    services {
      radius-flow-tap {
        traceoptions {
          file myFile10;
        }
        source-ipv4-address 192.168.100.1;
        interfaces {
          vt-1/1/10.0;
        }
      }
    }
```

Related Documentation

- Subscriber Secure Policy Overview on page 557
- Configuring DTCP-Initiated Subscriber Secure Policy Mirroring Overview on page 573

Example: Subscriber Secure Policy Dynamic Profile

In this example, subscriber secure policy mirroring is configured for subscriber access using user-defined variables and Junos predefined variables. This example is for the flow-tap service configured on a router without a Tunnel Services PIC.

The user-defined variables equate to RADIUS settings as follows:

User-Defined Variable Name	Junos Variable	RADIUS VSA Name	RADIUS Attribute Number	Example RADIUS Setting
ssp-intercept-id	$ssp-intercept-id	Interception Identifier	26–59	subscriber-bg–2350
ssp-destination-addr	$ssp-destination-addr	MD-IP-Address	26–60	192.163.100.22
ssp-destination-port	$ssp-destination-port	MD-Port-Number	26–61	2222

```
variables {
  var ssp-intercept-id;
  var ssp-destination-addr;
  var ssp-destination-port;
  }
  interfaces {
    <*> {
      unit <*> {
        family inet {
          filter {
            input ssp;
            output ssp;
          }
        }
      }
    }
  }
  firewall {
    family inet {
      filter ssp {
        term $ssp-id {
          from {
            # optional classifiers.
          }
          then {
            flowtap-destination-address $ssp-destination-addr;
            flowtap-destination-port $ssp-destination-port;
            flowtap;
          }
        }
      }
    }
  }
```

Example: SNMPv3 Traps Configuration for Subscriber Secure Policy Mirroring

This example shows an SNMP configuration that provides SNMPv3 trap support.

Configure the SNMPv3 trap support at the **[edit snmp]** hierarchy level.

```
[edit snmp]
view system {
   oid 1.3.6.1.2.1.1 include;
}
view all {
   oid .1 include;
}
v3 {
   notify n1 {
      type trap;
      tag mediation8;
   }
   notify-filter nf1 {
      oid .1 include;
   }
   target-address london-1 {
      address 172.19.87.240; # Address of the mediation device receiving the traps
      port 162;
      tag-list mediation-8;
      target-parameters tp1 {
         parameters {
            message-processing-model v3;
            security-model usm;
            security-level authentication;
            security-name mediation-device1; # Name of the mediation device
         }
         notify-filter nf1;
      }
   }
   usm {
      local-engine {
         user mediation-device1 { # Name of the mediation device
            authentication-md5 {
               authentication-key
               "yourAuthenticationKey"
            }
            privacy-des {
               privacy-password "yourPrivacyPassword"
            }
         }
      }
   }
   vacm {
      access {
         group london-10 {
            default-context-prefix {
               security-model usm {
                  security-level privacy {
```

```
                read-view system;
                notify-view all;
              }
            }
          }
        }
      }
      security-to-group {
        security-model usm {
          security-name mediation-device1 { # Name of the mediation device
            group london-10;
          }
        }
      }
    }
  }
```

Related Documentation

- Subscriber Secure Policy Overview on page 557
- Configuring SNMPv3 Traps for Subscriber Secure Policy Mirroring on page 578
- For information about SNMPv3, see the *Junos Network Management Configuration Guide*

PART 14

Class of Service for Subscriber Access

CHAPTER 59

Dynamic CoS for Subscriber Access Overview

CoS for Subscriber Access Overview

This topic describes class-of-service (CoS) functionality for dynamic subscriber access.

Junos CoS enables you to divide traffic into classes and offer various levels of throughput and packet loss when congestion occurs. This allows packet loss to happen according to rules that you configure. The Junos CoS features provide a set of mechanisms that you can use to provide differentiated services when best-effort traffic delivery is insufficient.

In a subscriber access environment, service providers want to provide video, voice, and data services over the same network for subscribers. Subscriber traffic is delivered from the access network, through a router, through a switched Ethernet network, to an Ethernet digital subscriber line access multiplexer (DSLAM). The DSLAM, in turn, forwards the subscriber's traffic to the residential gateway over a digital subscriber line (DSL). An MX Series router that is installed in a subscriber access network as an edge router can perform subscriber management functions that include subscriber identification and per-subscriber CoS.

In a subscriber access network, a subscriber is an authenticated user—a user that has logged in to the access network at a subscriber interface and then been verified by the configured authentication server and subsequently granted initial CoS services. Subscribers can be identified statically or dynamically. In this network, subscribers are mapped to VLANs, demux, or PPPoE interfaces.

You can configure the router to provide *hierarchical scheduling* or *per-unit scheduling* for subscribers.

Hierarchical CoS enables you to apply traffic scheduling and queuing parameters (which can include a delay-buffer bandwidth) and packet transmission scheduling parameters (which can include buffer management parameters) to an individual subscriber interface rather than to all interfaces configured on the port. Hierarchical CoS enables you to dynamically modify queues when subscribers require services.

Per-unit scheduling enables one set of output queues for each logical interface configured under the physical interface. In per-unit scheduling configurations, each Layer 3 scheduler node is allocated a dedicated set of queues.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 601
- Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 603
- Configuring Per-Unit Scheduling in a Dynamic Profile for Subscriber Access on page 605

Guidelines for Configuring Dynamic CoS for Subscriber Access

This topic describes the hardware requirements and guidelines for configuring dynamic CoS in a subscriber access environment.

Hardware Requirements for Dynamic CoS

Table 60 on page 593 lists the hardware requirements based on subscriber interface type for the hierarchical scheduling and per-unit scheduling dynamic CoS configurations.

Table 60: Hardware Required for Dynamic CoS Configurations

Dynamic CoS Configuration	Subscriber Interface Type	EQ DPCs on MX Series Routers	Trio MPC/MIC Modules on MX Series Routers	IQ2 PICs on M120 and M320 Routers	IQ2E PICs on M120 and M320 Routers
Hierarchical CoS	Static and dynamic VLANs	Yes	Yes	No	No
	Static and dynamic VLANs over aggregated Ethernet	Yes	Yes	No	No
	Dynamic IP demux interfaces	Yes	Yes	No	No
	Dynamic IP demux interfaces over aggregated Ethernet	Yes	Yes	No	No
	Dynamic VLAN demux interfaces	No	Yes	No	No
	Static PPPoE interfaces	No	Yes	Yes	Yes
	Dynamic PPPoE interfaces	No	Yes	No	Yes
	L2TP LAC tunnel over PPP	No	Yes	No	No

Table 60: Hardware Required for Dynamic CoS Configurations *(continued)*

Dynamic CoS Configuration	Subscriber Interface Type	EQ DPCs on MX Series Routers	Trio MPC/MIC Modules on MX Series Routers	IQ2 PICs on M120 and M320 Routers	IQ2E PICs on M120 and M320 Routers
Per-unit scheduling	Static and dynamic VLANs	Yes	Yes	No	No
	Static and dynamic VLANs over aggregated Ethernet	No	No	No	No
	Dynamic IP demux interfaces	Yes	No	No	No
	Dynamic IP demux interfaces over aggregated Ethernet	No	No	No	No
	Dynamic VLAN demux interfaces	No	No	No	No
	Static PPPoE interfaces	No	Yes	Yes	Yes
	Dynamic PPPoE interfaces	No	No	Yes	Yes
	L2TP LAC tunnel over PPP	No	No	No	No

Configuration Guidelines for Dynamic Scheduling and Queuing

When configuring scheduling and queuing for subscriber access, consider the following guidelines:

- You can configure dynamic CoS with one of the following scheduling configurations:
  - For hierarchical scheduling configurations, you must enable hierarchical scheduling in the static CLI for the interface referenced in the dynamic profile. If not, the dynamic profile fails.
  - For per-unit scheduling configurations, you must enable per-unit scheduling in the static CLI for the interface referenced in the dynamic profile. If not, the dynamic profile fails and schedulers are not attached to the interface.
- You configure the traffic scheduling and shaping parameters in a traffic-control profile within the dynamic profile. You can configure the scheduler map and schedulers in a dynamic profile or in the **[edit class-of-service]** hierarchy. You must statically configure the remaining CoS parameters, such as hierarchical scheduling, classifiers, drop profiles, and forwarding classes, in the **[edit class-of-service]** hierarchy.

- You can configure only one traffic-control-profile under a dynamic profile.
- You must define the output-traffic-control-profile that binds the traffic-control profile to the interface within the same dynamic profile as the interface.
- We recommend that you provide different names for the schedulers defined in dynamic profiles that are used for access and services. For example, if there are two dynamic profiles, voice-profile and video-profile, provide unique names for the schedulers defined under those profiles.
- You must use a service dynamic profile with a different profile name for each RADIUS CoA request over the same logical interface.

Configuration Guidelines for Dynamic Classifiers and Rewrite Rules

When you configure classifiers and rewrite rules for subscriber access, consider the following guidelines:

- To apply classifiers and rewrite rules to a subscriber interface in a dynamic profile, you must configure the rewrite rule and classifier definitions in the static **[edit class-of-service]** hierarchy and reference them in the dynamic profile.
  - If a static classifier or a rewrite rule definition that is referenced by a dynamic subscriber interface does not exist, the configuration is invalid and the subscriber cannot log in.
  - If a network administrator changes the static classifiers and rewrite rules definitions that are referenced in a dynamic profile with an active subscriber interface logged in, the changes are applied to the active subscriber interface immediately.
  - If a network administrator deletes a classifier or a rewrite rule definition that is referenced by an active dynamic subscriber interface, the system removes the classifier or rewrite rule binding from the interface. The classifier is replaced by the default classifier. If the network administrator adds the removed classifier or rewrite rule to the configuration while the dynamic interface is active, the addition does not take effect until the subscriber logs out and then logs in again.
- IP demux interfaces can only instantiate Layer 3 rules (both rewrite rules and classifiers).

- An IP demux subscriber interface can implicitly inherit a classifier from the underlying interface. If an IP demux interface is created without a classifier and a Layer 2 classifier is attached to the underlying interface, the IP demux interface also inherits the Layer 2 classifier. The **show class-of-service interface *interface-name*** command does not display this attachment.

  Table 61 on page 596 lists the classification rule configuration for an IP demux subscriber interface with a VLAN underlying interface.

Table 61: IP Demux Classification Rules

VLAN Underlying Interface Classifier Configuration	IP Demux Interface Classifier Configuration	Resulting Classifier Configuration
Layer 2	—	VLAN Layer 2
Layer 2	Layer 3	Demux Layer 3
Layer 3	—	Default
Layer 3	Layer 3	Demux Layer 3

- An IP demux subscriber interface explicitly inherits Layer 2 rewrite rules from the underlying interface if a Layer 2 rewrite rule is present. The **show class-of-service interface *interface-name*** command displays the attachment.

  Table 62 on page 596 lists the rewrite rule configuration for an IP demux subscriber interface with a VLAN underlying interface.

Table 62: IP Demux Rewrite Rules

VLAN Underlying Interface Rewrite Rule Configuration	IP Demux Interface Rewrite Rule Configuration	Resulting Rewrite Rule Configuration
Layer 2	—	VLAN Layer 2
Layer 2	Layer 3	VLAN Layer 2 and demux Layer 3
Layer 3	—	Default
Layer 3	Layer 3	Demux Layer 3

- An L2TP subscriber interface can implicitly inherit a classifier from the underlying interface.

  Table 63 on page 597 lists the classification rule configuration for an L2TP LAC subscriber interface with a VLAN underlying interface.

Table 63: L2TP Classification Rules

VLAN Underlying Interface Classifier Configuration	L2TP LAC Classifier Configuration	Resulting Classifier Configuration
Layer 2 or Fixed	Layer 2 or Fixed	VLAN Layer 2 or Fixed
Layer 2 or Fixed	Layer 3	Demux/PPPoE Layer 3
Layer 3	Layer 2 or Fixed	VLAN Layer 2 or Fixed
Layer 3	Layer 3	Demux/PPPoE Layer 3

- .An L2TP LAC subscriber interface explicitly inherits Layer 2 rewrite rules from the underlying interface if a Layer 2 rewrite rule is present. Table 64 on page 597 lists the rewrite rule configuration for an L2TP LAC subscriber interface with a VLAN underlying interface.

Table 64: L2TP LAC Rewrite Rules

VLAN Underlying Interface Rewrite Rule Configuration	L2TP Interface Rewrite Rule Configuration	Resulting Rewrite Rule Configuration
Layer 2	Layer 2	VLAN Layer 2
Layer 2	Layer 3	VLAN Layer 2 and demux/PPPoE Layer 3
Layer 3	Layer 2	VLAN Layer 2 and demux/PPPoE Layer 3
Layer 3	Layer 3	Demux/PPPoE Layer 3

Configuration Guidelines for Dynamic Excess Bandwidth Distribution

When you configure excess bandwidth distribution parameters for subscriber access, consider the following guidelines:

For queues, you cannot configure the excess rate or excess priority in these cases:

- When the **transmit-rate exact** statement is configured. In this case, the shaping rate is equal to the transmit rate and the queue does not operate in the excess region.
- When the scheduling priority is configured as **strict-high**. In this case, the queue gets all available bandwidth and never operates in the excess region.
- When logical interface units are configured in peak information rate (PIR) mode. The excess rate distributes excess bandwidth once the scheduling nodes reach their guaranteed rate. In PIR mode, none of the scheduling nodes have guaranteed rates configured, so you do not need to configure the excess rate.

Configuration Guidelines for Dynamic CoS on Aggregated Ethernet Interfaces

Keep the following guidelines in mind when configuring static or dynamic CoS for a subscriber interface on a VLAN stacked on a two-link aggregated Ethernet logical interface:

- Configure the aggregated Ethernet logical interface over two physical interfaces capable of performing hierarchical scheduling. For more information, see Table 60 on page 593.
- Configure the aggregated Ethernet logical interface with both underlying links operating in link-protect mode.
- You can apply static or dynamic CoS characteristics to a scheduler node at the aggregated Ethernet logical interface or its underlying physical interface, but not at an interface set.

Configuration Guidelines for Dynamic COS on PPPoE Interfaces

For specific configuration guidelines, see “CoS for PPPoE Subscriber Interfaces Overview” on page 636.

Configuration Guidelines for Dynamic CoS on L2TP Interfaces

For additional configuration guidelines, see “CoS for L2TP Subscriber Interfaces Overview” on page 636.

Configuration Guidelines for Dynamic CoS on Interface Sets

Keep the following guidelines in mind when configuring dynamic interface sets:

- Dynamic interface sets are not supported for aggregated Ethernet interfaces.
- You can configure the interface set and the traffic scheduling and shaping parameters in the dynamic profile. However, you must apply the traffic-control profile to the interface set in the static **[edit class-of-service]** hierarchy.

- The **$junos-interface-set-name** predefined variable is available only for RADIUS Accept messages; change of authorization (CoA) requests are not supported.
- An interface can only belong to one interface set. If you try to add the same interface to different interface sets, the commit operation fails.

Related Documentation

- CoS for Subscriber Access Overview on page 591
- Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 601
- Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 603
- Configuring Per-Unit Scheduling in a Dynamic Profile for Subscriber Access on page 605
- For information about static CoS configurations, see the *Junos OS Class of Service Configuration Guide*

CHAPTER 60

Configuration Summary of Dynamic CoS for Subscriber Access

Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access

You configure static scheduling and queuing in a dynamic profile for subscriber access.

To configure CoS in a dynamic profile for subscriber access using static scheduling and queuing parameters:

1. Configure the static CoS parameters in the **[edit class-of-service]** hierarchy.
   a. Enable the hierarchical scheduler for the interface.

      See Configuring Hierarchical Schedulers for CoS.

   b. Configure the scheduler map and schedulers.

      When you configure static scheduling and queuing in a dynamic profile, you reference the scheduler map in the dynamic profile.

      See Configuring Schedulers.

   c. Configure the drop profiles.

      See Configuring RED Drop Profiles.

   d. Configure the forwarding classes.

      See Configuring Forwarding Classes

   e. Configure the rewrite-rules and classifier definitions.

      See Configuring Rewrite Rules and Defining Classifiers.

See the *Junos OS Class of Service Configuration Guide* for information about configuring the remaining CoS parameters.

2. Configure a static or dynamic subscriber interface that can be referenced in the dynamic profile.
   - For static VLAN interfaces, see "Configuring Static Subscriber Interfaces in Dynamic Profiles" on page 397.
   - For dynamic VLAN interfaces, see "Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet" on page 433.
   - For dynamic IP demux interfaces, see "Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles" on page 403 and "Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet" on page 434.
   - For dynamic VLAN demux interfaces, see "Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles" on page 404.
   - For dynamic PPPoE interfaces, see "Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles" on page 467.
3. Configure CoS parameters in a dynamic profile.
   a. Configure the dynamic profile.

      See "Configuring a Basic Dynamic Profile" on page 349.

   b. Configure traffic shaping and scheduling parameters in the dynamic profile using a traffic-control profile.

      Reference the scheduler map you configured in the static **[edit class-of-service]** hierarchy.

      See "Configuring Static Traffic Shaping and Scheduling Parameters in a Dynamic Profile" on page 609.

   c. Apply CoS parameters to a subscriber interface by referencing an interface in the dynamic profile.

      See "Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile" on page 617.

4. To configure default values for subscribers on login, and enable subscribers to replace other CoS parameters when replacing services, configure variables in the dynamic profile.

   See "Configuring User-Defined CoS Variables in a Dynamic Service Profile" on page 630.

Related Documentation

- For hardware requirements and configuration guidelines, see Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- CoS for Subscriber Access Overview on page 591
- Example: Configuring Static Hierarchical Scheduling and Queuing for Subscriber Access on page 645

Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access

You can configure dynamic scheduling and queuing in dynamic profile for subscriber access.

To configure dynamic scheduling and queuing for subscriber access using dynamic scheduling and queuing parameters:

1. Configure the static CoS parameters in the **[edit class-of-service]** hierarchy.
   a. Enable the hierarchical scheduler for the interface.

      See Configuring Hierarchical Schedulers for CoS.

   b. Configure the drop profiles.

      See Configuring RED Drop Profiles.

   c. Configure the forwarding classes.

      See Configuring Forwarding Classes

   d. Configure the rewrite-rules and classifier definitions.

      See Configuring Rewrite Rules and Defining Classifiers.

   See the *Junos OS Class of Service Configuration Guide* for information about configuring the remaining CoS parameters.
2. Configure a static or dynamic subscriber interface that can be referenced in the dynamic profile.
   - For static VLAN interfaces, see “Configuring Static Subscriber Interfaces in Dynamic Profiles” on page 397.
   - For dynamic VLAN interfaces, see “Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet” on page 433.
   - For dynamic IP demux interfaces, see “Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles” on page 403 and “Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet” on page 434.
   - For dynamic VLAN demux interfaces, see “Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles” on page 404.
   - For dynamic PPPoE interfaces, see “Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles” on page 467.

3. Configure CoS parameters in a dynamic profile.

   a. Configure the dynamic profile.

      See “Configuring a Basic Dynamic Profile” on page 349.

   b. Configure traffic shaping and scheduling parameters in the dynamic profile using a traffic-control profile.

      See “Configuring Traffic Scheduling and Shaping for Subscriber Access” on page 609.

   c. Configure the schedulers and scheduler map in the dynamic profile.

      You can configure the schedulers using dynamic variables or a combination of both static values and dynamic variables.

      See “Configuring Schedulers in a Dynamic Profile for Subscriber Access” on page 611.

   d. Apply CoS parameters to a subscriber interface by referencing an interface in the dynamic profile.

      - For traffic shaping and scheduling, see “Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile” on page 617.
      - For rewrite-rules, see “Applying a Rewrite Rule Definition to a Subscriber Interface in a Dynamic Profile” on page 617.
      - For classifiers, see “Applying a Classifier to a Subscriber Interface in a Dynamic Profile” on page 618.

4. (Optional) Configure variables in access and service profiles to enable RADIUS to activate subscriber and upgrade services through CoA.

   NOTE: Do not instantiate a CoA request using a service dynamic profile that is already in use on the same logical interface.

   a. Configure user-defined CoS variables in a dynamic profile.

      See “Configuring User-Defined CoS Variables in a Dynamic Service Profile” on page 630

   b. (Optional) Enable multiple clients for the same subscriber (logical interface) to aggregate attributes by configuring the **aggregate-clients** option for the dynamic profile attached to a DHCP subscriber interface.

      See “Attaching Dynamic Profiles to DHCP Subscriber Interfaces” on page 109.

      Because you have configured the scheduler map in the dynamic profile, queues are merged when subscribers change services. Other CoS parameters are replaced.

      When multiple subscribers are enabled on a DHCP subscriber interface, and the dynamic profile referenced by DHCP does not have the **replace** keyword configured, the system does not replace the parameters. Instead, it combines the values of the parameters to their maximum scalar value.

Related Documentation

- For hardware requirements and configuration guidelines, see Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- CoS for Subscriber Access Overview on page 591
- Example: Configuring Dynamic Hierarchical Scheduling and Queuing for Subscriber Access on page 647

Configuring Per-Unit Scheduling in a Dynamic Profile for Subscriber Access

Per-unit scheduling enables one set of output queues for each logical interface configured under the physical interface. In per-unit scheduling configurations, each Layer 3 scheduler node is allocated a dedicated set of queues.

If you do not explicitly configure CoS parameters, a default traffic profile with queues is attached to the logical interface.

To configure per-unit scheduling and queuing for subscriber access:

1. Configure the static CoS parameters in the **[edit class-of-service]** hierarchy.
   a. Enable the per-unit scheduler for the physical interface.

      [edit interfaces *interface-name*]
      user@host# set per-unit-scheduler

   b. Configure the drop profiles.

      See Configuring RED Drop Profiles.

   c. Configure the forwarding classes.

      See Configuring Forwarding Classes

   d. Configure the rewrite-rules and classifier definitions.

      See Configuring Rewrite Rules and Defining Classifiers.

   See the *Junos OS Class of Service Configuration Guide* for information about configuring the remaining CoS parameters.
2. Configure a static or dynamic subscriber interface that can be referenced in the dynamic profile.
   - For static VLAN interfaces, see “Configuring Static Subscriber Interfaces in Dynamic Profiles” on page 397.
   - For dynamic IP demux interfaces, see “Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles” on page 403.
   - For dynamic PPPoE interfaces, see “Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles” on page 467.

3. Configure CoS parameters in a dynamic profile.

   a. Configure the dynamic profile.

      See “Configuring a Basic Dynamic Profile” on page 349.

   b. Configure traffic shaping and scheduling parameters in the dynamic profile using a traffic-control profile.

      See “Configuring Traffic Scheduling and Shaping for Subscriber Access” on page 609.

   c. Configure the schedulers and scheduler map in the dynamic profile.

      You can configure the schedulers using dynamic variables or a combination of both static values and dynamic variables.

      See “Configuring Schedulers in a Dynamic Profile for Subscriber Access” on page 611.

   d. Apply CoS parameters to a subscriber interface by referencing an interface in the dynamic profile.

      - For traffic shaping and scheduling, see “Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile” on page 617.
      - For rewrite rules, see “Applying a Rewrite Rule Definition to a Subscriber Interface in a Dynamic Profile” on page 617.
      - For classifiers, see “Applying a Classifier to a Subscriber Interface in a Dynamic Profile” on page 618.

4. (Optional) Configure variables in access and service profiles to enable RADIUS to activate subscriber and upgrade services through CoA.

   NOTE: Do not instantiate a CoA request using a service dynamic profile that is already in use on the same logical interface.

   Because you have configured the scheduler map in the dynamic profile, queues are merged when subscribers change services. Other CoS parameters are replaced.

   When multiple subscribers are enabled on a DHCP subscriber interface, and the dynamic profile referenced by DHCP does not have the **replace** keyword configured, the system does not replace the parameters. Instead, it combines the values of the parameters to their maximum scalar value.

   a. Configure CoS variables in a dynamic profile.

      See “Configuring User-Defined CoS Variables in a Dynamic Service Profile” on page 630

   b. (Optional) Enable multiple clients for the same subscriber (logical interface) to aggregate attributes by configuring the **aggregate-clients** option for the dynamic profile attached to a DHCP subscriber interface.

      See “Attaching Dynamic Profiles to DHCP Subscriber Interfaces” on page 109.

Related Documentation

- CoS for Subscriber Access Overview on page 591
- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Example: Configuring Per-Unit Scheduling for Subscriber Access

CHAPTER 61

Configuring Dynamic Shaping and Scheduling for Subscriber Access

Configuring Traffic Scheduling and Shaping for Subscriber Access

You use traffic-control profiles to configure traffic shaping and scheduling properties. When you reference a traffic-control profile in a dynamic profile, you can provide hierarchical shaping and scheduling for a subscriber interface.

You can choose to configure static values or dynamic variables for the shaping parameters. The values for the dynamic variables are obtained from RADIUS when a subscriber logs in or when a subscriber changes services.

You cannot configure a traffic-control profile that contains a combination of static and dynamic parameters.

This topic includes the following tasks:

Configuring Static Traffic Shaping and Scheduling Parameters in a Dynamic Profile

To configure static traffic shaping and scheduling parameters in a traffic-control profile:

1. Create the traffic-control profile and assign a name.

   [edit dynamic-profiles business-profile class-of-service]
   user@host# **edit traffic-control-profiles** ***profile-name***

2. Do one of the following:

- Reference a static scheduler map in the dynamic profile. The scheduler map is statically configured in the **[edit class-of-service]** hierarchy.

  [edit dynamic-profiles business-profile class-of-service traffic-control-profiles *profile-name*]
  user@host# **set scheduler-map** *map-name*

- Reference a dynamic scheduler map in the dynamic profile. The scheduler map is dynamically configured in the **[edit dynamic-profiles** *profile-name* **class-of-service scheduler-maps]** hierarchy.

  [edit dynamic-profiles business-profile class-of-service traffic-control-profiles *profile-name*]
  user@host# **set scheduler-map** *(map-name)*

3. Configure the shaping rate to be used in the dynamic profile.

   [edit dynamic-profiles business-profile class-of-service traffic-control-profiles *profile-name*]
   user@host# **set shaping-rate (percent** *percentage* **|** *rate***)**

4. Configure the guaranteed rate to be used in the dynamic profile.

   [edit dynamic-profiles business-profile class-of-service traffic-control-profiles *profile-name*]
   user@host# **set guaranteed-rate (percent** *percentage* **|** *rate***)**

5. Configure the delay-buffer rate.

   If you do not include this statement, the delay-buffer rate is based on the guaranteed rate if one is configured, or the shaping rate if no guaranteed rate is configured.

   [edit dynamic-profiles business-profile class-of-service traffic-control-profiles *profile-name*]
   user@host# **set delay-buffer-rate (percent** *percentage* **|** *rate***)**

Configuring Dynamic Traffic Shaping and Scheduling Parameters in a Dynamic Profile

You can configure variables for the traffic shaping and scheduling parameters. The values for the parameters are dynamically obtained by RADIUS when a subscriber logs in or changes a service.

To configure dynamic traffic-control profiles in a dynamic profile:

1. Create the traffic-control profile.

   [edit dynamic-profiles business-profile class-of-service]
   user@host# **edit traffic-control-profiles** *profile-name*

2. Configure the scheduler map variable.

   [edit dynamic-profiles business-profile class-of-service traffic-control-profiles *profile-name*]
   user@host# **set scheduler-map $juno-cos-scheduler-map**

3. Configure the shaping rate variable.

   [edit dynamic-profiles business-profile class-of-service traffic-control-profiles *profile-name*]
   user@host# **set shaping-rate $junos-cos-shaping-rate**

4. Configure the guaranteed rate variable.

   [edit dynamic-profiles business-profile class-of-service traffic-control-profiles *profile-name*]
   user@host# **set guaranteed-rate $junos-cos-guaranteed-rate**

5. Configure a variable for the delay-buffer rate.

   If you do not include this statement, the delay-buffer rate is based on the guaranteed rate if one is configured, or the shaping rate if no guaranteed rate is configured.

   [edit dynamic-profiles business-profile class-of-service traffic-control-profiles *profile-name*]
   user@host# **set delay-buffer-rate $junos-cos-delay-buffer-rate**

Related Documentation

- For hardware requirements and configuration guidelines, see Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- CoS for Subscriber Access Overview on page 591
- Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 601
- Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 603
- Example: Configuring Static Hierarchical Scheduling and Queuing for Subscriber Access on page 645
- Example: Configuring Dynamic Hierarchical Scheduling and Queuing for Subscriber Access on page 647
- Verifying the Scheduling and Shaping Configuration for Subscriber Access on page 619

Configuring Schedulers in a Dynamic Profile for Subscriber Access

You use schedulers to define the parameters of output queues. These properties include the amount of interface bandwidth assigned to the queue, the size of the memory buffer allocated for storing packets, the priority of the queue, and the tail drop profiles associated with the queue.

You can configure up to four schedulers in a dynamic profile.

Within a dynamic profile, you can choose to define schedulers with static values, dynamic variables, or a combination of static values and dynamic variables. The dynamic variables enable RADIUS to provide the value for the scheduler parameter when the subscriber logs in.

- Configuring Static Schedulers in a Dynamic Profile on page 612
- Configuring Dynamic Schedulers with Variables in a Dynamic Profile on page 613
- Configuring a Combination of Static and Dynamic Scheduler Parameters in a Scheduler Definition on page 614

Configuring Static Schedulers in a Dynamic Profile

This topic describes how to configure schedulers with static values in a dynamic profile for subscriber access.

To configure static scheduling and queuing in a dynamic profile:

1. Configure the scheduler and queuing parameters.
   a. Specify the scheduler for which you want to configure parameters.

      [edit dynamic-profiles *profile-name* class-of-service]
      user@host# **set schedulers *scheduler-name***

   b. Configure the buffer size.

      [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]
      user@host# **set buffer-size remainder**

   c. Configure the drop-profile map and drop profile.

      [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]
      user@host# **set drop-profile-map loss-priority any protocol any drop-profile d3**

   d. Configure the priority.

      [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]
      user@host# **set priority low**

   e. Configure the transmit rate.

      [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]
      user@host# **set transmit-rate percent 40**

   f. Configure the excess rate.

      [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]
      user@host# **set excess-rate percent 90**

   g. (Optional) Configure the priority value for the excess-rate.

      [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]
      user@host# **set excess-priority high**

2. Associate the scheduler with a scheduler map.
   a. Configure the scheduler map name.

      [edit dynamic-profiles *profile-name* class-of-service]
      user@host# **set scheduler-maps data-smap**

   b. Configure the forwarding class.

      [edit dynamic-profiles *profile-name* class-of-service scheduler-maps *map-name*]
      user@host# **set forwarding-class be**

   c. Configure the scheduler.

      [edit dynamic-profiles *profile-name* class-of-service scheduler-maps *map-name*
      forwarding-class *forwarding-class-name*]

```
user@host# set scheduler be_sch
```

Configuring Dynamic Schedulers with Variables in a Dynamic Profile

You can configure variables for the dynamic scheduler parameters. These values are dynamically obtained by RADIUS when a subscriber logs in or changes a service using a RADIUS change of authorization (CoA) message.

To configure dynamic scheduling and queuing in a dynamic profile:

1. Configure the scheduler and queuing parameters.
   a. Specify the scheduler name using a variable.

      ```
      [edit dynamic-profiles profile-name class-of-service]
      user@host# set schedulers $junos-cos-scheduler
      ```

   b. Configure the variable for the buffer size.

      ```
      [edit dynamic-profiles profile-name class-of-service schedulers
        $junos-cos-scheduler]
      user@host# set buffer-size $junos-cos-scheduler-bs
      ```

   c. Configure the variables for the drop-profile maps and the drop profile.

      ```
      [edit dynamic-profiles profile-name class-of-service schedulers
        $junos-cos-scheduler]
      user@host# set drop-profile-map loss-priority low protocol any drop-profile
        $junos-cos-scheduler-low
      user@host# set drop-profile-map loss-priority medium-low protocol any
        drop-profile $junos-cos-scheduler-medium-low
      user@host# set drop-profile-map loss-priority medium-high protocol any
        drop-profile $junos-cos-scheduler-medium-high
      user@host# set drop-profile-map loss-priority high protocol any drop-profile
        $junos-cos-scheduler-high
      user@host# set drop-profile-map loss-priority any protocol any drop-profile
        “$junos-cos-scheduler-any
      ```

   d. Configure the variable for the priority.

      ```
      [edit dynamic-profiles profile-name class-of-service schedulers
        $junos-cos-scheduler]
      user@host# set priority $junos-cos-scheduler-pri
      ```

   e. Configure the variable for the transmit rate.

      ```
      [edit dynamic-profiles profile-name class-of-service schedulers
        $junos-cos-scheduler]
      user@host# set transmit-rate $juno-cos-scheduler-tx
      ```

   f. Configure the variable for the excess rate.

      ```
      [edit dynamic-profiles profile-name class-of-service schedulers
        $junos-cos-scheduler]
      user@host# set excess-rate $juno-cos-scheduler-excess-rate
      ```

   g. Configure the variable for the priority of the excess-rate.

```
[edit dynamic-profiles profile-name class-of-service schedulers
  $junos-cos-scheduler]
user@host# set excess-rate $juno-cos-scheduler-excess-priority
```

2. Associate the scheduler with a scheduler map.

   a. Configure the scheduler map name.

   ```
   [edit dynamic-profiles profile-name class-of-service]
   user@host# set scheduler-maps data-smap
   ```

   b. Configure the forwarding class.

   ```
   [edit dynamic-profiles profile-name class-of-service scheduler-maps data-smap]
   user@host# set forwarding-class be
   ```

   c. Configure the scheduler.

   ```
   [edit dynamic-profiles profile-name class-of-service scheduler-maps data-smap
     forwarding-class be]
   user@host# set scheduler $junos-cos-scheduler
   ```

Configuring a Combination of Static and Dynamic Scheduler Parameters in a Scheduler Definition

Within a dynamic profile, you can choose to configure one dynamic scheduler definition, or combine static and dynamic scheduler parameters in many static scheduler definitions.

Combining static and dynamic scheduler parameters enables you to provide subscribers with unique rate configurations that the RADIUS definitions for predefined variables do not allow.

To configure a scheduler definition that contains static and dynamic scheduling and queuing parameters:

1. Configure the scheduler definition.

   a. Specify the scheduler name.

   NOTE: To configure a static scheduler that contains both static and dynamic parameters, you must specify a unique scheduler name, not the $junos-cos-scheduler variable.

   ```
   [edit dynamic-profiles profile-name class-of-service]
   user@host# set schedulers scheduler-name
   ```

   b. Configure the buffer size.

   Do either of the following:

   - Configure a static value.

   ```
   [edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
   user@host# set buffer-size $junos-cos-scheduler-bs
   ```

   - Configure a variable.

   ```
   [edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
   ```

```
user@host# set buffer-size $junos-cos-scheduler-bs
```

c. Configure the drop-profile maps, the drop profile, and the priority.

Do either of the following:

- Configure static values.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set drop-profile-map loss-priority any protocol any drop-profile d3
```

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set priority low
```

- Configure variables.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set drop-profile-map loss-priority low protocol any drop-profile
  $junos-cos-scheduler-low
user@host# set drop-profile-map loss-priority medium-low protocol any
  drop-profile $junos-cos-scheduler-medium-low
user@host# set drop-profile-map loss-priority medium-high protocol any
  drop-profile $junos-cos-scheduler-medium-high
user@host# set drop-profile-map loss-priority high protocol any drop-profile
  $junos-cos-scheduler-high
user@host# set drop-profile-map loss-priority any protocol any drop-profile
  “$junos-cos-scheduler-any
```

d. Configure the priority.

Do either of the following:

- Configure a static value.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set priority
```

- Configure a variable.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set priority $junos-cos-scheduler-pri
```

e. Configure the transmit rate.

Do either of the following:

- Configure a static value.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set transmit-rate
```

- Configure a variable.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set transmit-rate $juno-cos-scheduler-tx
```

f. Configure the excess rate.

Do either of the following:

- Configure a static value.

  [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]
  user@host# **set excess-rate proportion 250**

- Configure a variable.

  [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]
  user@host# **set excess-rate $juno-cos-scheduler-excess-rate**

g. Configure the priority for the excess-rate.

Do either of the following:

- Configure a static value.

  [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]
  user@host# **set excess-priority high**

- Configure a variable.

  [edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]
  user@host# **set excess-rate $juno-cos-scheduler-excess-priority**

2. Associate the scheduler with a scheduler map.

   a. Configure the scheduler map name.

      [edit dynamic-profiles *profile-name* class-of-service]
      user@host# **set scheduler-maps data-smap**

   b. Configure the forwarding class.

      [edit dynamic-profiles *profile-name* class-of-service scheduler-maps data-smap]
      user@host# **set forwarding-class be**

   c. Configure the scheduler.

      [edit dynamic-profiles *profile-name* class-of-service scheduler-maps data-smap
      forwarding-class be]
      user@host# **set scheduler $junos-cos-scheduler**

Related Documentation

- For hardware requirements and configuration guidelines, see Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 603
- Verifying the Scheduling and Shaping Configuration for Subscriber Access on page 619
- Changing CoS Services Overview on page 625

Applying CoS Parameters to a Subscriber Interface in a Dynamic Profile

You provide CoS parameters to a subscriber by associating the CoS parameters with an interface in a dynamic profile.

Traffic and scheduling parameters can be configured in the dynamic profile and associated with a subscriber by attaching an output traffic control profile to the interface in the dynamic profile.

You configure rewrite rules and classifiers statically in the **[edit class-of-service]** hierarchy and reference them in the dynamic profile.

- Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile on page 617
- Applying a Rewrite Rule Definition to a Subscriber Interface in a Dynamic Profile on page 617
- Applying a Classifier to a Subscriber Interface in a Dynamic Profile on page 618

Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile

After you configure the traffic shaping and scheduling CoS parameters in a dynamic profile, you apply them to an interface. The output-traffic control profile enables you to provide traffic scheduling to the interface.

To apply CoS attributes to an interface in a dynamic profile:

1. Specify that you want to apply CoS attributes to an interface in the dynamic profile.

   user@host# **edit dynamic-profiles** *profile-name* **class-of-service**

2. Configure the interface name and logical interface using a variable, and apply the output-traffic control profile to the interface.

   Reference the name of the traffic-control profile that contains the scheduling properties that you want to use.

   [edit dynamic-profiles *profile-name* class-of-service interfaces]
   user@host# **set interfaces $junos-interface-ifd-name unit $junos-underlying-interface-unit output-traffic-control-profile** *profile-name*

Applying a Rewrite Rule Definition to a Subscriber Interface in a Dynamic Profile

Rewrite rules define the marking for various CoS values, including DSCP, DSCP IPv6, IP precedence, and IEEE 802.1 CoS values. Rewrite rules have an associated forwarding class and code-point alias or bit set.

For dynamic CoS, you define the rewrite rules mapping for the CoS values statically, then reference the rewrite rule configuration in the dynamic profile for the subscriber interface.

To configure a rewrite rule in a dynamic profile:

1. Define the rewrite-rules mapping for the traffic that passes through all queues on the interface. The available rewrite-rules types for dynamic CoS are **dscp**, **dscpv6**, **ieee-802.1** and **inet-precedence**.

   See Configuring Rewrite Rules.

2. Apply the rewrite-rules definition to the subscriber interface in the dynamic profile.

   [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number*]

user@host# **edit rewrite-rules**

3. Configure the applicable rewrite rule markers in the dynamic profile.

   - For DSCP:

     [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules]
     user@host# **set dscp (*rewrite-name* | default)**

   - For DSCPv6:

     [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules]
     user@host# **set dscp-ipv6 (*rewrite-name* | default)**

   - For IEEE 802.1:

     [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules]
     user@host# **set ieee-802.1 (*rewrite-name* | default) vlan-tag (outer | outer-and-inner)**

   - For inet-precedence:

     [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules]
     user@host# **set inet-precedence (*rewrite-name* | default)**

Applying a Classifier to a Subscriber Interface in a Dynamic Profile

You can apply the classification map to a subscriber interface in a dynamic profile.

For dynamic CoS, you define the classification map for the CoS values statically, then reference the classifier configuration in the dynamic profile for the subscriber interface.

To apply a classifier to an interface in a dynamic profile:

1. Define the classifier.

   The available classifier types for subscriber access are **dscp**, **dscp-ipv6**, **ieee-802.1**, and **inet-precedence**.

   See Defining Classifiers.

2. Apply the classifier definition to the subscriber interface in the dynamic profile.

   [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number*]
   user@host# **edit classifiers**

3. Configure the applicable classifiers in the dynamic profile.

   - For DSCP:

     [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* classifiers]
     user@host# **set dscp (*classifier-name* | default)**

   - For DSCPv6:

[edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* classifiers]
user@host# **set dscp-ipv6 (*classifier-name* | default)**

- For IEEE 802.1:

  [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* classifiers]
  user@host# **set ieee-802.1 (*classifier-name* | default) vlan-tag (inner | outer)**

- For inet-precedence:

  [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* classifiers]
  user@host# **set inet-precedence (*classifier-name* | default)**

Related Documentation

- Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 601
- Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 603
- CoS for Subscriber Access Overview on page 591

Verifying the Scheduling and Shaping Configuration for Subscriber Access

Purpose View the class-of-service (CoS) configurations that are referenced in a dynamic profile for subscriber access.

Action

- To display the entire CoS configuration, including static and dynamic parameters:

  user@host> **show class-of-service**

- To display the CoS configuration for a subscriber interface:

  user@host> **show class-of-service interface**

- To display traffic shaping and scheduling profiles:

  user@host> **show class-of-service traffic-control-profile**

- To display the mapping of schedulers to forwarding classes and a summary of scheduler parameters for each entry:

  user@host> **show class-of-service scheduler-map**

CHAPTER 62

RADIUS and Dynamic CoS Overview

Subscriber Interfaces That Provide Initial CoS Parameters Dynamically Obtained from RADIUS

You can configure interface-specific CoS parameters that the router obtains when subscribers log in at appropriately configured static or dynamic subscriber interfaces. This feature is supported only for interfaces on Enhanced Queuing Dense Port Concentrators (EQ DPCs) in MX Series Ethernet Services Routers.

To configure a dynamic profile to provide initial CoS Services, make sure you understand the following concepts:

Dynamic Configuration of Initial CoS in Access Profiles

When a router interface receives a join message from a DHCP subscriber, the Junos OS applies the values configured in the dynamic profile associated with that router interface. A dynamic profile that is activated through its association with a subscriber interface is known as an *access dynamic profile*. You can associate a dynamic profile with a subscriber interface on the router by including statements at the **[edit dynamic-profiles *profile-name* class-of-service interfaces]** hierarchy level.

The Junos OS supports predefined variables for obtaining a scheduler-map name and traffic-shaping parameters from the RADIUS authentication server and predefined variables for obtaining a scheduler name and scheduler parameters from the RADIUS authentication server. When a client authenticates over a router interface associated with the access dynamic profile, the router replaces the predefined variables with interface-specific values obtained from the RADIUS server.

NOTE: To associate dynamically configured initial CoS features with a subscriber interface, reference *Junos predefined variables*—and not *user-defined variables*—in an *access* dynamic profile for that interface.

Predefined Variables for Dynamic Configuration of Initial Traffic Shaping

You can configure an access dynamic profile that provides initial traffic-shaping parameters when a subscriber logs in. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.

If you define the Juniper Networks authentication and authorization VSA for CoS traffic-shaping parameter values (attribute number 26–108) on the RADIUS authentication server, the RADIUS server includes the values in RADIUS Access-Accept messages it sends to the router when a subscriber successfully authenticates over the interface.

To provide an initial scheduler map name and traffic shaping parameters obtained from the RADIUS authentication server when a subscriber logs in, reference the Junos predefined variables for CoS listed in Table 65 on page 622 in an access dynamic profile associated with the subscriber interface.

Table 65: CoS Predefined Variables for Scheduler Map and Traffic Shaping

Variable	Description
$junos-cos-scheduler-map	Scheduler-map name to be dynamically configured in a traffic-control profile in the access dynamic profile when a subscriber logs in. **NOTE:** The scheduler map referenced by the **scheduler-map** statement can be defined dynamically (at the **[edit dynamic-profiles *profile-name* class-of-service scheduler-maps]** hierarchy level) or statically (at the **[edit class-of-service scheduler-maps]** hierarchy level).
$junos-cos-shaping-rate	Shaping rate to be dynamically configured in a traffic-control profile in the access dynamic profile when a subscriber logs in. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
$junos-cos-guaranteed-rate	Guaranteed rate to be dynamically configured in a traffic-control profile in the access dynamic profile when a subscriber logs in. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
$junos-cos-delay-buffer-rate	Delay-buffer rate to be dynamically configured in a traffic-control profile in the access dynamic profile when a subscriber logs in. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.

Predefined Variables for Dynamic Configuration of Initial Scheduling and Queuing

You can configure an access dynamic profile that provides initial traffic-shaping parameters when a subscriber logs in. The Junos OS obtains this information from the

RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.

If you define the Juniper Networks authentication and authorization VSA for CoS scheduling and queuing parameter values (attribute number 26–146) on the RADIUS authentication server, the RADIUS server includes the values in RADIUS Access-Accept messages it sends to the router when a subscriber successfully authenticates over the interface.

To provide an initial scheduler name and scheduler and queuing parameters obtained from the RADIUS authentication server when a subscriber logs in, reference the Junos predefined variables listed in Table 66 on page 623 in an access dynamic profile associated with the subscriber interface.

Table 66: CoS Predefined Variables for Scheduling and Queuing

Variable	Description
$junos-cos-scheduler	Name of a scheduler to be dynamically configured in the access dynamic profile. You can configure a RADIUS authentication server to include this information in the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
$junos-cos-scheduler-transmit-rate	Transmit rate to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
$junos-cos-scheduler-bs	Buffer size, as a percentage of total buffer, to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
$junos-cos-scheduler-pri	Packet-scheduling priority value to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
$junos-cos-scheduler-dropfile-low	Name of the drop profile for RED for loss-priority level **low** to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached. **NOTE:** The drop profile must be configured statically (at the **[edit class-of-service schedulers *scheduler-name* drop-profiles]** hierarchy level) for loss-priority **low**.

Table 66: CoS Predefined Variables for Scheduling and Queuing *(continued)*

Variable	Description
$junos-cos-scheduler-dropfile-medium-low	Name of the drop profile for RED for loss-priority level **medium-low** to be dynamically configured for the scheduler in the access dynamic profile. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached. **NOTE:** The drop profile must be configured statically (at the **[edit class-of-service schedulers *scheduler-name* drop-profiles]** hierarchy level).
$junos-cos-scheduler-dropfile-medium-high	Name of the drop profile for RED for loss-priority level **medium-high** to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached. **NOTE:** The drop profile must be configured statically (at the **[edit class-of-service schedulers *scheduler-name* drop-profiles]** hierarchy level).
$junos-cos-scheduler-dropfile-high	Name of the drop profile for RED for loss-priority level **high** to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached. **NOTE:** The drop profile must be configured statically (at the **[edit class-of-service schedulers *scheduler-name* drop-profiles]** hierarchy level).
$junos-cos-scheduler-dropfile-any	Name of the drop profile for RED for loss-priority level **any** to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached. **NOTE:** The drop profile must be configured statically (at the **[edit class-of-service schedulers *scheduler-name* drop-profiles]** hierarchy level).

Related Documentation

- Activating Subscribers and Managing Services in an Access Network on page 7
- Dynamic Profiles Overview on page 325
- Dynamic Variables Overview on page 327
- Junos Predefined Variables on page 328
- Configuring Initial CoS Parameters Dynamically Obtained from RADIUS on page 629
- Example: Configuring Initial CoS Parameters Dynamically Obtained from RADIUS on page 653

Changing CoS Services Overview

This topic describes how to provide CoS when subscribers dynamically upgrade or downgrade services in an access environment.

You can configure your network with an *subscriber access profile* that provides all subscribers with default CoS parameters when they log in. For example, all subscribers can receive a basic data service. By configuring the access profile with Junos predefined variables for RADIUS-provided CoS parameters, you also enable the service to be activated for those subscribers at login.

To enable subscribers to activate a service or upgrade to different services through RADIUS change-of-authorization (CoA) messages after login, configure a *subscriber service profile* that includes user-defined variables.

Types of CoS Variables Used in a Service Profile

You can configure variables for the following CoS parameters in a service profile:

- Shaping rate
- Delay buffer rate
- Guaranteed rate
- Scheduler map

For each CoS parameter, you must associate a RADIUS vendor ID. For each vendor ID, you must assign an attribute number and a tag. The tag is used to differentiate between values for different CoS variables when you specify the same attribute number for those variables. These values are matched with the values supplied by RADIUS during subscriber authentication. All of the values in the dynamic profile must be defined in RADIUS or none of the values are passed.

Optionally, you can configure default values for each parameter. Configuring default values is beneficial if you do not configure RADIUS to enable service changes. During service changes, RADIUS takes precedence over the default value that is configured.

Static and Dynamic CoS Configurations

Depending on how you configure CoS parameters in the access and service profiles, certain CoS parameters are replaced or merged when subscribers change or activate new services.

Static configuration is when you configure the scheduler map and schedulers in the static **[edit class-of-service]** hierarchy and reference the scheduler map in the dynamic profile. Dynamic configuration is when you configure the scheduler map and schedulers within the dynamic profile.

The CoS configuration also depends on whether you have enabled multiple subscribers on the same logical interface using the **aggregate-clients** statements in the dynamic profile referenced by DHCP. When you specify the **aggregate-clients merge** statement, the scheduler map names specified in the dynamic profile are appended. When you

specify the **aggregate-clients replace** statement, the scheduler map names are replaced. In both cases, if the length of the scheduler map name exceeds 128 characters, subscribers cannot log in.

Scenarios for Static and Dynamic Configuration of CoS Parameters

Table 67 on page 626 lists the scenarios for static and dynamic configuration of CoS parameters in access profiles and service profiles at subscriber login. The table also lists the behavior for each configuration for service activation and service modification using RADIUS CoA messages.

Table 67: CoS Services and Variables

Scenario	Static CoS Configuration (Single Subscriber)	Dynamic CoS Configuration (Single Subscriber)	Dynamic CoS Configuration (Multiple Subscribers Enabled on a Logical Interface with the aggregate-clients merge Statement)	Dynamic CoS Configuration (Multiple Subscribers Enabled on a Logical Interface with the aggregate-clients replace Statement)
Subscriber login	• Configure RADIUS values or default values for all parameters in access profile • Configure scheduler map in **edit class-of-service** hierarchy and reference in access profile	• Configure RADIUS values or default values for all parameters in access profile • Configure scheduler map and schedulers in access profile	• Configure RADIUS values or default values for all parameters in access profile • Configure scheduler map and schedulers in access profile	• Configure RADIUS values or default values for all parameters in access profile • Configure scheduler map and schedulers in access profile
RADIUS CoA for service or variable change	Replaces the following parameters: • Delay buffer rate • Guaranteed rate • Scheduler map • Shaping rate	Replaces the following parameters: • Delay buffer rate • Guaranteed rate • Shaping rate • Scheduler map	Combines the values of the following parameters to their maximum scalar value: • Delay buffer rate • Guaranteed rate • Shaping rate Appends the scheduler map parameter	Replaces the following parameters: • Delay buffer rate • Guaranteed rate • Shaping rate • Scheduler map
RADIUS CoA for service activation	Does not merge queues	Merge queues if the queue specified in the service profile is not already in use for the subscriber **NOTE:** Do not instantiate a CoA request using a service dynamic profile that is already in use on the same logical interface.	Merge queues if the queue specified in the service profile is not already in use for the subscriber **NOTE:** Do not instantiate a CoA request using a service dynamic profile that is already in use on the same logical interface.	Merge queues if the queue specified in the service profile is not already in use for the subscriber **NOTE:** Do not instantiate a CoA request using a service dynamic profile that is already in use on the same logical interface.

Related Documentation

- Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 601
- Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 603
- Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview on page 89
- RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework on page 38
- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592

CHAPTER 63

Configuring RADIUS for Dynamic CoS

Configuring Initial CoS Parameters Dynamically Obtained from RADIUS

You can configure a subscriber interface so that subscribers receive initial CoS parameters that the router obtains from the RADIUS authentication server when subscribers log in using that logical interface on the router.

1. Configure external RADIUS server VSAs with values that you expect subscribers to log in with.
   - To configure a RADIUS authentication server to include CoS traffic-shaping parameters in authentication grants on certain subscriber interfaces, configure Juniper Networks VSA 26–108.
   - To configure a RADIUS authentication server to include CoS scheduling and queuing parameters in authentication grants a certain subscriber interfaces, configure Juniper Networks VSA 28–146.

   See “Configuring Router or Switch Interaction with RADIUS Servers” on page 19 and “Configuring RADIUS Server Parameters for Subscriber Access” on page 26.
2. Configure a subscriber interface that supports hierarchical CoS.
   - For static VLAN interfaces, see “Configuring Static Subscriber Interfaces in Dynamic Profiles” on page 397.
   - For static VLAN interfaces over aggregated Ethernet, see “Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet” on page 433.
   - For static IP demux interface sets, see “Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles” on page 403.
   - For dynamic IP demux interface sets, see “Configuring a Subscriber Interface Using a Set of Static IP Demux Interfaces” on page 400
3. Associate a traffic control profile with the interface.

   See “Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile” on page 617.

4. Configuring initial traffic-shaping parameters to be obtained from RADIUS.

   See “Configuring Dynamic Traffic Shaping and Scheduling Parameters in a Dynamic Profile” on page 610.

5. Configure forwarding classes and scheduler maps statically.

   See Configuring Forwarding Classes and Configuring Scheduler Maps.

6. Configure a scheduler to specify initial scheduling and queuing parameters to be dynamically obtained from RADIUS when a subscriber logs in.

   See “Configuring Dynamic Schedulers with Variables in a Dynamic Profile” on page 613.

Related Documentation

- Subscriber Interfaces That Provide Initial CoS Parameters Dynamically Obtained from RADIUS on page 621
- Example: Configuring Initial CoS Parameters Dynamically Obtained from RADIUS on page 653
- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Activating Subscribers and Managing Services in an Access Network on page 7
- Juniper Networks VSAs Supported by the AAA Service Framework on page 45
- Dynamic Profiles Overview on page 325
- Dynamic Variables Overview on page 327
- Junos Predefined Variables on page 328

Configuring User-Defined CoS Variables in a Dynamic Service Profile

You can configure user-defined variables in the dynamic service profile for traffic scheduling and shaping parameters.

NOTE: The Junos predefined variables for dynamic CoS are only to be used in dynamic access profiles and not in dynamic service profiles.

You can use variables in a dynamic service profile in two ways:

- To enable subscribers to upgrade or downgrade services after login using a RADIUS change of authorization (CoA), configure user-defined variables for CoS parameters as RADIUS attributes.
- To provide subscribers with default values for CoS parameters, configure user-defined variables for CoS parameters with static default values. If you have configured values to be supplied by a RADIUS CoA, subscribers can receive the previously configured default value when deactivating a service.

You activate the variables by referencing them in the traffic control profile configured in the dynamic service profile.

To configure user-defined variables for CoS in a dynamic profile:

1. Specify that you want to configure variables in the dynamic profile.

   [edit dynamic-profiles residential-silver variables]

2. Do one of the following to configure variables for the shaping rate:

   - Enable RADIUS to modify the shaping rate based on service changes.

     a. Configure the attribute:

        [edit dynamic-profiles residential-silver variables]
        user@host# set srate radius vendor-id 4874 attribute 108

     b. Configure the tag:

        [edit dynamic-profiles residential-silver variables]
        user@host# set srate radius vendor-id 4874 tag 2

     NOTE: You can configure user-defined values for RADIUS tags that are different than the values that are required in access profiles with predefined variables. For example, in a dynamic service profile, you could assign the shaping rate with a tag of 1 rather than 2, which is required for the $junos-shaping-rate variable. When you configure user-defined values, the VSA that is sent from RADIUS must share the same definition.

   - Configure a default value for the shaping rate.

     [edit dynamic-profiles residential-silver variables]
     user@host# set srate default-value 10m

3. Do one of the following to configure variables for the guaranteed rate.

   - Enable RADIUS to modify the guaranteed rate based on service changes.

     a. Configure the attribute:

        [edit dynamic-profiles residential-silver variables]
        user@host# set grate radius vendor-id 4874 attribute 108

     b. Configure the tag:

        [edit dynamic-profiles residential-silver variables]
        user@host# set grate radius vendor-id 4874 tag 3

   - Configure a default value for the guaranteed rate.

     [edit dynamic-profiles residential-silver variables]
     user@host# set grate default-value 5m

4. Do one of the following to configure variables for the delay buffer rate:

   - Enable RADIUS to modify the delay buffer rate based on service changes.

     a. Configure the attribute:

        [edit dynamic-profiles residential-silver variables]
        user@host# set dbrate radius vendor-id 4874 attribute 108

b. Configure the tag:

```
[edit dynamic-profiles residential-silver variables]
user@host# set dbrate radius vendor-id 4874 tag 4
```

- Configure a default value for the delay buffer rate.

```
[edit dynamic-profiles residential-silver variables]
user@host# set dbrate default-value 10m
```

5. Do one of the following to configure variables for the scheduler map.

- Enable RADIUS to modify the scheduler map based on service changes.

a. Configure the attribute:

```
[edit dynamic-profiles residential-silver variables]
user@host# set smap radius vendor-id 4874 attribute 108
```

b. Configure the tag:

```
[edit dynamic-profiles residential-silver variables]
user@host# set smap radius vendor-id 4874 tag 1
```

- Configure a default value for the scheduler map.

```
[edit dynamic-profiles residential-silver variables]
user@host# set smap default-value triple-play
```

6. Configure the variables for the CoS parameters in the traffic control profile.

Either the shaping rate or the guaranteed rate are required in the traffic control profile.

a. Specify that you want to configure CoS parameters in the dynamic profile.

```
user@host# edit dynamic-profiles residential-silver class-of-service
  traffic-control-profiles tcp1
```

b. Configure the scheduler map variable.

```
[edit dynamic-profiles residential-silver class-of-service traffic-control-profiles
  tcp1]
user@host# set scheduler-map "$smap"
```

c. Configure the shaping rate variable.

```
[edit dynamic-profiles residential-silver class-of-service traffic-control-profiles
  tcp1]
user@host# set shaping-rate "$srate"
```

d. Configure the guaranteed rate variable.

```
[edit dynamic-profiles residential-silver class-of-service traffic-control-profiles
  tcp1]
user@host# set guaranteed-rate "$grate"
```

e. Configure the delay buffer rate variable.

```
[edit dynamic-profiles residential-silver class-of-service traffic-control-profiles
  tcp1]
user@host# set delay-buffer-rate "$dbrate"
```

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Changing CoS Services Overview on page 625

CHAPTER 64

Interface Solutions for Dynamic CoS Overview

CoS and Static IP Demux Interface Set Overview

This topic describes the scenario for configuring hierarchical scheduling on a set of statically created IP demux interfaces.

An interface set enables you to group IP demux interfaces into logical groups, and shape that group by binding a traffic control-profile to the interface set. You can also configure the remaining traffic on interface set to shape IP demux interfaces without traffic-control profiles to an aggregate rate.

Table 68 on page 635 shows the scheduler mapping for interface sets of IP demux interfaces.

Table 68: Scheduler Mapping for Interface Sets

Level	Type	Mapping
L4	Queues	Demux interface
L3	Scheduler	Demux interface
L2	Scheduler	Interface set of IP demux interfaces
L1	Scheduler	Underlying demux interface

Related Documentation

- Configuring CoS on a Set of Static IP Demux Interfaces on page 641

CoS for PPPoE Subscriber Interfaces Overview

You can configure CoS functionality for static and dynamic PPPoE subscriber interfaces configured on Gigabit Ethernet Intelligent Queuing 2 (IQ2) and Ethernet Enhanced IQ2 (IQ2E) PICs on the M120 and M320 routers, and the Trio MPC/MIC family of products on the MX Series Ethernet Services Router.

For all supported hardware platforms, you can attach an output traffic control profile that contains basic shaping and scheduling properties directly to a PPPoE interface. In this type of scenario, you could use each PPPoE interface to represent a household and shape all of the household traffic to an aggregate rate. Each forwarding class is mapped to a queue, and represents one type of services provided to a household customer.

Both the IQ2E PIC and the Trio MPC/MIC family of products support hierarchical scheduling functionality that is not available on the IQ2 PIC. To shape customer or DSLAM traffic at different levels of the PPPoE interface hierarchy, you can attach traffic control profiles to interface sets that contain PPPoE members.

NOTE: For static PPPoE underlying logical interfaces, use PPPoE interface sets.

Related Documentation

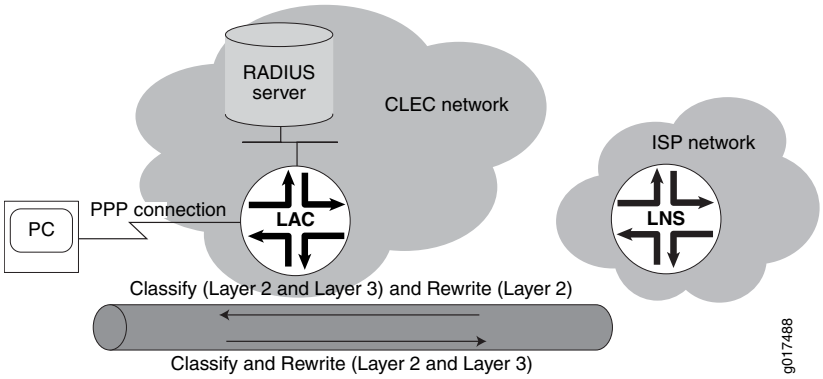
- Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 601
- Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 603
- Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface on page 640
- For more information about the IQ2 and IQ2 PICs, see the *Junos OS Class of Service Configuration Guide*

CoS for L2TP Subscriber Interfaces Overview

In Layer 2 Tunnel Protocol (L2TP) configurations, IP and L2TP headers are added to packets arriving at a PPP subscriber interface on the L2TP access concentrator (LAC) before being tunneled to the L2TP network server (LNS). You can manage the IP header by configuring classifiers and rewrite-rules that transfer the ToS (Type of Service) value or the 802.1p value from the *inner* IP header to the *outer* IP header of the L2TP packet.

Figure 13 on page 637 shows the classifier and rewrite rules that you can configure from the LAC to the LNS, and from the LNS to the LAC.

Figure 13: CoS Configuration for Simple L2TP Topology



Traffic from LAC to LNS

To set the ToS value or the 802.1p value on the inner IP header, you can configure both fixed and behavior aggregate (BA) classifiers for subscribers at Layer 2 or Layer 3 of the network.

Table 69 on page 637 lists the configuration options for applying classifiers to a subscriber interface on an ingress LAC tunnel.

Table 69: Ingress LAC Tunnel Classifier Options

Classifier	Subscriber Interface
Fixed	Either of the following: • PPP interface • Underlying VLAN interface
Layer 2	Either of the following: • PPP interface • Underlying VLAN interface
Layer 3	Family of PPP interfaces

You cannot configure a Layer 2 and fixed classifier together.

The behavior of the Layer 2 and Layer 3 classifiers depends on the configuration. For example, a Layer 3 classifier for a family of PPP interfaces overrides a Layer 2 classifier configured at the PPP interface, except for the unknown packets and control packets.

If you do not configure a classifier for Layer 2, the system applies the default Layer 3 classifier so that tunneled and terminated subscribers have the same behavior. To prevent unknown packets and control packets from being discarded, the system assigns them to the best-effort forwarding class.

Traffic from LNS to LAC

For egress tunnels, you configure rewrite rules at the PPP interface to set the ToS or 802.1p value of the outer IP header. Rewrite rules are applied accordingly to the forwarding class, packet loss priority (PLP), and code point.

Mapping the inner IP header to the outer IP header of the L2TP packet depends on the classifier and rewrite-rule configurations. For example, Table 70 on page 638 lists the values for the classifier and rewrite rules for a VLAN interface. For assured forwarding, the inner 802.1p value (ob001) is classified with the assured-forwarding class and low loss priority at the ingress interface. Based on the assured-forwarding class and low loss priority in the rewrite rule, the ToS value in the outer IP header is set to ob001.

Table 70: Sample Result

Inner .1p Value	Forwarding Class	Loss Priority	Code Point	Outer ToS Value
ob000	best-effort	low	000	ob000
ob001	assured-forwarding	low	001	ob001
ob101	expedited-forwarding	low	101	ob101
ob111	network-control	low	11	ob111

Related Documentation

- Managing the IP Header Values for an L2TP LAC Tunnel with Dynamic CoS on page 643

CHAPTER 65

Configuring Interface Solutions for Dynamic CoS

Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links

You can configure hierarchical CoS on a subscriber interface with an underlying aggregated Ethernet interface.

You must enable link protection on the aggregated Ethernet interface for hierarchical CoS to operate on these subscriber interfaces.

Before you begin, configure the subscriber interface with aggregated Ethernet:

- For static and dynamic VLAN interfaces, see “Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet” on page 433.
- For static and dynamic IP demux interfaces, see “Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet” on page 434.

1. Configure hierarchical CoS on the link aggregation (LAG) bundle.

   a. Specify that you want to access the LAG bundle.

      user@host# edit interfaces ae*x*

   b. Configure the link aggregation (LAG) bundle with hierarchical scheduler mode.

      [edit interfaces ae*x*]
      user@host# set hierarchical-scheduler

2. Configure the aggregated Ethernet options to support the hierarchical CoS parameters.

For the subscriber interface to support static or dynamic hierarchical CoS, all links must operate in link-protect mode.

a. Specify that you want to configure the aggregated Ethernet options.

```
user@host# edit interfaces aex aggregated-ether-options]
```

b. Configure the link protection mode.

```
[edit interfaces aex aggregated-ether-options]
user@host# set link-protection
```

You can now attach static or dynamic traffic shaping and scheduling parameters at the aggregated Ethernet logical interface or its underlying physical interface. See:

- Configuring Traffic Scheduling and Shaping for Subscriber Access on page 609
- Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 611
- Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile on page 617

Related Documentation

- For hardware requirements and configuration guidelines, see Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Verifying the Scheduling and Shaping Configuration for Subscriber Access on page 619
- CoS for Subscriber Access Overview on page 591

Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface

You can configure hierarchical CoS on a static PPPoE subscriber interface.

Before you begin:

- Configure the static PPPoE subscriber interface.

  See Configuring PPPoE.

To configure hierarchical CoS on a static PPPoE subscriber interface:

1. Specify the PPPoE interface that you want to configure.

   ```
   user@host# edit interfaces pppoe-interface-name
   ```

2. Configure the hierarchical scheduler for the interface.

   ```
   [edit interfaces interface-name]
   user@host# set hierarchical-scheduler
   ```

3. (Optional) Group the PPPoE interfaces in an interface set.

   ```
   [edit]
   user@host# edit interfaces interface-set interface-set-name
   ```

You can now configure static traffic and scheduling parameters for each traffic-control profile, and attach each traffic-control profile to the PPPoE interface or the PPPoE interface set. For more information, see the *Junos OS Class of Service Configuration Guide*.

Related Documentation

- For hardware requirements and configuration guidelines, see Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- CoS for PPPoE Subscriber Interfaces Overview on page 636
- Example: Configuring Hierarchical Scheduling and Queuing for a Static PPPoE Subscriber Interface on page 659
- Example: Configuring Hierarchical Scheduling and Queuing for an Underlying Static PPPoE Subscriber Interface on page 661
- Example: Configuring Hierarchical Scheduling and Queuing for an Interface Set of Static PPPoE Subscriber Interfaces on page 663
- Verifying the Scheduling and Shaping Configuration for Subscriber Access on page 619

Configuring CoS on a Set of Static IP Demux Interfaces

You can configure CoS on a set of static IP demux interfaces. The static IP demux interface represents a subscriber.

Although the interface set is applied at the **[edit interfaces]** hierarchy level, the CoS parameters for the interface set are defined at the **[edit class-of-service interfaces]** hierarchy level, usually with the **output-traffic control profile** statement.

Before you configure CoS on a static subscriber interface:

- Configure the static IP demux interface.

  See “Configuring a Subscriber Interface Using a Set of Static IP Demux Interfaces” on page 400.

To configure CoS on a set of static IP demux interfaces:

1. Define the CoS parameters for the interface set.

```
[edit]
class-of-service {
  traffic-control-profiles {
    voice {
      scheduler-map voice;
      shaping-rate 64k;
    }
    video {
      scheduler-map video;
      shaping-rate 5m;
    }
    data {
      scheduler-map data;
      shaping-rate 3m;
    }
```

```
    t2 {
      shaping-rate 7m;
    }
  }
```

2. Apply the CoS parameters to the interface set.

```
[edit]
class-of-service {
  interfaces {
    interface-set demux-set1 {
      output-traffic-control-profile t2;
    }
    interface-set demux-set2 {
      output-traffic-control-profile t2;
    }
    demux0 {
      unit 0 {
        output-traffic-control-profile voice;
      }
      unit 1 {
        output-traffic-control-profile video;
      }
      unit 2 {
        output-traffic-control-profile data;
      }
      unit 3 {
        output-traffic-control-profile voice;
      }
      unit 4 {
        output-traffic-control-profile video;
      }
      unit 5 {
        output-traffic-control-profile data;
      }
    }
  }
  scheduler-maps {
    voice {
      forwarding-class assured-forwarding scheduler s0;
    }
    video {
      forwarding-class expedited-forwarding scheduler s0;
    }
    data {
      forwarding-class best-effort scheduler s0;
    }
  }
  schedulers {
    s0 {
      transmit-rate percent 100;
      buffer-size percent 100;
    }
  }
}
```

Related Documentation

- For more information about interface sets and hierarchical scheduling for VLANs, see the *Junos OS Class of Service Configuration Guide*

Managing the IP Header Values for an L2TP LAC Tunnel with Dynamic CoS

In L2TP configurations, IP and L2TP headers are added to packets arriving at a PPP subscriber interface on the LAC before being tunneled to the L2TP network server (LNS).

Classifiers and rewrite rules enable you to properly transfer the ToS (Type of Service) value or the 802.1p value from the inner IP header to the outer IP header of the L2TP packet.

To manage the IP header values for a LAC tunnel:

1. Configure the classifier for the inner tunnel.
   a. Define the fixed or behavior aggregate (BA) classifier.
      - To configure a BA classifier:

        [edit class-of-service]
        user@host#set classifiers (ieee-802.1 | inet-precedence) *classifier-name* forwarding-class *class-name* loss-priority *level* code-points [*aliases*] [*bit-patterns*]

      - To configure a fixed classifier:

        [edit class-of-service interfaces *interface-name* unit *logical-unit-number*]
        user@host# set forwarding-class *class-name*

   b. Apply the classifier to the Layer 2 interface or Layer 3 interface. For Layer 2, you can apply the classifier at the PPP interface or an underlying VLAN interface. For Layer 3, you can apply classifiers to a family of PPP interfaces.
      - To apply the classifier for the IEEE 802.1p value:

        [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* classifiers]
        user@host# set ieee-802.1 (*classifier-name* | default) vlan-tag (inner | outer)

      - To apply the classifier for the ToS value:

        [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* classifiers]
        user@host# set inet-precedence (*classifier-name* | default)

2. Configure the rewrite rule for the egress tunnel.
   a. Configure the rewrite rule with the forwarding class and the loss priority value.

      [edit class-of-service]
      user@host# set rewrite-rules (ieee-802.1 | inet-precedence) *rewrite-name* forwarding-class *class-name* loss-priority *level* code-point (*alias* | *bits*)

   b. Apply the rewrite rule to the PPP interface for which the L2TP tunnel is configured.
      - To apply the rewrite-rule for the IEEE 802.1p value:

```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name
  unit logical-unit-number rewrite-rules]
user@host# set ieee-802.1 (rewrite-name | default) vlan-tag (outer |
  outer-and-inner)
```

- To apply the rewrite rule for the ToS value:

```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name
  unit logical-unit-number rewrite-rules]
user@host# set inet-precedence (rewrite-name | default)
```

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- CoS for L2TP Subscriber Interfaces Overview on page 636
- Configuring an L2TP LAC on page 219

Configuring an Interface Set of Subscribers in a Dynamic Profile

Interface sets enable you to provide hierarchical scheduling to a group of subscriber interfaces.

To configure an interface set of subscriber interfaces:

1. Configure the interface-set in the dynamic profile.

   The interface-set will be dynamically created when the subscriber logs in.

   ```
   [edit dynamic-profiles profile-name interfaces interface-name]
   user@host#set interface-set $junos-interface-set-name
   ```

2. Include the interfaces within the dynamic interface-set.

   ```
   [edit dynamic-profiles profile-name interfaces interface-name interface-set
     $junos-interface-set-name ]
   user@host# set interface interface-name unit logical-unit-number
   ```

3. Apply traffic shaping and queuing parameters to the interface set.

   TIP: You must configure the interface-set in the static [edit class-of-service] hierarchy, not the [edit dynamic-profiles] hierarchy.

   ```
   [edit class-of-service interfaces]
   user@host# edit interface-set interface-set-name
   [edit class-of-service interfaces interface-set interface-set-name]
   user@host# set output-traffic-control-profile profile-name
   ```

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Example: Configuring a Dynamic Interface Set of VLAN Subscribers on page 666

CHAPTER 66

Dynamic CoS for Subscriber Access Examples

Example: Configuring Static Hierarchical Scheduling and Queuing for Subscriber Access

This example shows you how to configure CoS for a subscriber in a dynamic profile. The CoS parameters configure a best-effort, data service for subscribers.

1. Configure the static CoS parameters in the **[edit class-of-service]** hierarchy.

   You must configure the scheduler maps in this hierarchy; it will get referenced in the dynamic profile.

   ```
   class-of-service {
     forwarding-classes {
       queue 0 best-effort;
       queue 1 expedited-forwarding;
       queue 3 network-control;
       queue 2 assured-forwarding;
   ```

```
    }
    scheduler-maps {
      data_smap {
        forwarding-class best-effort scheduler be_sch;
      }
    }
    schedulers {
      be_sch {
        transmit-rate percent 10;
        buffer-size remainder;
        priority low;
      }
    }
}
```

2. Configure the subscriber interface in the **[edit interfaces]** hierarchy. Enable hierarchical scheduling for the interface.

```
interfaces {
  ge-2/2/0 {
    hierarchical-scheduler;
    vlan-tagging;
    unit 100 {
      vlan-id 100;
      family inet {
        unnumbered-address lo0.0 preferred-source-address 100.0.0.1;
      }
    }
  }
}
```

3. Configure CoS in the dynamic profile.

```
dynamic-profiles {
  data-service {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit" {
          family inet;
        }
      }
    }
    class-of-service {
      traffic-control-profiles {
        tcp1 {
          scheduler-map data_smap;
          shaping-rate 50k;
          guaranteed-rate 10k;
        }
      }
      interfaces {
        "$junos-interface-ifd-name" {
          unit "$junos-underlying-interface-unit" {
            output-traffic-control-profile tcp1;
          }
        }
      }
```

```
    }
  }
}
```

Example: Configuring Dynamic Hierarchical Scheduling and Queuing for Subscriber Access

In this example, subscribers are provided with a data and voice service defined in an access profile when they initially log in. The RADIUS administrator supplies the initial values on the RADIUS server, and the service activation is performed at subscriber login.

After the initial login, the subscriber adds an assured forwarding service that is not defined in the original access profile. A service profile is used to configure the schedulers and a RADIUS CoA activates the service. The queues defined for the schedulers in the initial scheduler map and the new scheduler map are merged.

In addition, the values for the initial data and voice service are upgraded by the RADIUS administrator through a separate RADIUS CoA message.

To configure the initial service and enable the activation through a RADIUS CoA:

1. Configure the access profile for the service activation.

   a. Configure the VLAN interface for the access profile.

      ```
      [edit]
      dynamic-profiles access-profile {
        interfaces {
          $junos-interface-ifd-name {
            unit $junos-underlying-interface-unit {
              family inet;
            }
          }
        }
      }
      ```

   b. Configure the class of service parameters in the access profile. In this example, you configure Junos predefined variables that provide the initial scheduler name and scheduler parameters obtained from the RADIUS authentication server when the subscriber logs in.

      Include the configurations for the interfaces, schedulers, and the scheduler maps.

      ```
      [edit]
      dynamic-profiles access-profile {
        class-of-service {
          traffic-control-profiles {
            tcp1 {
              scheduler-map $junos-cos-scheduler-map;
              shaping-rate $junos-cos-shaping-rate;
              guaranteed-rate $junos-cos-guaranteed-rate;
              delay-buffer-rate $junos-cos-delay-buffer-rate;
            }
          }
          interfaces {
      ```

```
        $junos-interface-ifd-name {
          unit "$junos-underlying-interface-unit" {
            classifiers {
              ieee-802.1 l2_classifier;
            }
            rewrite-rules {
              ieee-802.1 l2_rewrite;
            }
          output-traffic-control-profile tcp1;
          }
        }
      }
      schedulers {
        $junos-cos-scheduler {
          buffer-size percent $junos-cos-scheduler-bs;
          priority $junos-cos-scheduler-pri;
          transmit-rate percent $junos-cos-scheduler-tx;
          drop-profile-map loss-priority low protocol any $junos-cos-scheduler-low;
          drop-profile-map loss-priority medium-low protocol any
            $junos-cos-scheduler-medium-low;
          drop-profile-map loss-priority medium-high protocol any
            $junos-cos-scheduler-medium-high;
          drop-profile-map loss-priority high protocol any $junos-cos-scheduler-high;
        }
      }
      scheduler-maps {
        data_voice_smap {
          forwarding-class be scheduler be_sch;
          forwarding-class ef scheduler ef_sch;
        }
      }
    }
  }
```

Table 71 on page 648 lists the initial values defined by the RADIUS administrator for the scheduler map and shaping rates.

Table 71: Initial Scheduler Map and Shaping Values at Subscriber Login

Predefined Variable	RADIUS Tag	Value
$junos-cos-scheduler-map	T01	data_voice_smap
$junos-cos-shaping-rate	T02	6m
$junos-cos-guaranteed-rate	T03	4m
$junos-cos-delay-buffer-rate	T04	4m

Table 72 on page 649 lists the initial values defined by the RADIUS administrator for the voice (expedited forwarding) scheduler.

Table 72: Initial CoS Values for the Voice Scheduler at Subscriber Login

Predefined Variable	Tag	Value
$junos-cos-scheduler	—	ef_sch
$junos-cos-scheduler-tx	T01	10
$junos-cos-scheduler-bs	T02	10
$junos-cos-scheduler-pri	T03	medium-high
$junos-cos-scheduler-dropfile-low	T04	d3
$junos-cos-scheduler-dropfile-medium-low	T05	d2
$junos-cos-scheduler-dropfile-medium-high	T06	d1
$junos-cos-scheduler-dropfile-high	T07	d0

Table 73 on page 649 lists the initial values defined by the RADIUS administrator for the data (best effort) scheduler.

Table 73: Initial CoS Values for the Data Scheduler at Subscriber Login

Predefined Variable	Tag	Value
$junos-cos-scheduler	—	be_sch
$junos-cos-scheduler-tx	T01	10
$junos-cos-scheduler-bs	T02	10
$junos-cos-scheduler-pri	T03	low
$junos-cos-scheduler-dropfile-low	T04	d0
$junos-cos-scheduler-dropfile-medium-low	T05	d1
$junos-cos-scheduler-dropfile-medium-high	T06	d2
$junos-cos-scheduler-dropfile-high	T07	d3

2. Configure the classifiers, drop profiles, forwarding classes, and rewrite rules in the static **[edit class-of-service]** hierarchy.

```
[edit]
class-of-service {
  classifiers {
    dscp dscp_classifier {
      forwarding-class be {
```

```
            loss-priority low code-points 000000;
        }
        forwarding-class af {
            loss-priority medium-low code-points 000001;
        }
    }
    ieee-802.1 l2_classifier {
        forwarding-class be {
            loss-priority medium-low code-points 000;
        }
        forwarding-class ef {
            loss-priority medium-low code-points 100;
        }
        forwarding-class af {
            loss-priority medium-low code-points 010;
        }
    }
}
drop-profiles {
    d0 {
        fill-level 25 drop-probability 100;
        fill-level 0 drop-probability 0;
    }
    d1 {
        fill-level 50 drop-probability 100;
        fill-level 0 drop-probability 0;
    }
    d2 {
        fill-level 75 drop-probability 100;
        fill-level 0 drop-probability 0;
    }
    d3 {
        fill-level 0 drop-probability 0;
        fill-level 100 drop-probability 100;
    }
}
forwarding-classes {
    queue 0 be;
    queue 1 ef;
    queue 2 af;
    queue 3 nc;
}
interfaces {
    ge-1/2/9 {
        shaping-rate 100m;
    }
}
rewrite-rules {
    ieee-802.1 l2_rewrite {
        forwarding-class be {
            loss-priority medium-low code-point 000;
        }
        forwarding-class ef {
            loss-priority medium-low code-point 001;
        }
        forwarding-class af {
```

```
            loss-priority medium-low code-point 100;
          }
        dscp l2_rewrite {
          forwarding-class be {
            loss-priority medium-low code-points 000;
          }
          forwarding-class ef {
            loss-priority medium-low code-points 001;
          }
          forwarding-class af {
            loss-priority medium-low code-points 001;
          }
      }
    }
```

3. Configure the service profile enable RADIUS to activate the video service after login. The video service corresponds to assured forwarding PHB.

   In this example, you configure Junos predefined variables that provide the initial scheduler name and scheduler parameters obtained from the RADIUS authentication server when the subscriber logs in.

```
[edit]
dynamic-profiles service-af {
  variables {
    af_fc default-value video;
    af_sch default-value af_sch;
    sch-drop-any default-value all;
    sch-pri-2 default-value strict-high;
    sch-bs-2 default-value 40;
    sch-tx-2 default-value 3m;
    smap default-value any
  }
    class-of-service {
      scheduler-maps {
        "$smap" {
          forwarding-class “$af_fc” scheduler “$af_sch”;
        }
      }
      schedulers {
        "$af_sch" {
          transmit-rate percent "$sch-tx-2";
          buffer-size percent "$sch-bs-2";
          priority "$sch-pri-2";
          drop-profile-map loss-priority any protocol any drop-profile “$sch-drop-any”;
        }
      }
    }
}
```

After the three services are activated, subscribers receive upgraded values for the data and voice service when RADIUS sends a change of authorization (CoA). In this case, the CoS parameters are replaced, because multiple subscribers were not enabled on the logical interface.

Table 74 on page 652 lists the upgraded values defined by the RADIUS administrator.

Table 74: Upgraded CoS Values for the Video Service

Variable	RADIUS Tag	Value
junos-cos-scheduler-map	T01	data_voice_smap
junos-cos-shaping-rate	T02	14m
junos-cos-guaranteed-rate	T03	13m
junos-cos-delay-buffer-rate	T04	12m

Table 75 on page 652 lists the values defined by the RADIUS administrator for the video (assured forwarding) scheduler.

Table 75: Upgraded CoS Values for the Video Scheduler

Predefined Variable	Tag	Value
$junos-cos-scheduler	—	af_sch
$junos-cos-scheduler-tx	T01	10
$junos-cos-scheduler-bs	T02	10
$junos-cos-scheduler-pri	T03	medium
$junos-cos-scheduler-dropfile-low	T04	d3
$junos-cos-scheduler-dropfile-medium-low	T05	d2
$junos-cos-scheduler-dropfile-medium-high	T06	d1
$junos-cos-scheduler-dropfile-high	T07	d0

Table 76 on page 652 lists the values defined by the RADIUS administrator for the expedited forwarding scheduler in the CoA message. The values are the same as the initial service.

Table 76: Initial CoS Values for the Expedited Forwarding Scheduler at Subscriber Login

Predefined Variable	Tag	Value
$junos-cos-scheduler	—	ef_sch
$junos-cos-scheduler-tx	T01	10
$junos-cos-scheduler-bs	T02	10
$junos-cos-scheduler-pri	T03	medium-high

Table 76: Initial CoS Values for the Expedited Forwarding Scheduler at Subscriber Login *(continued)*

Predefined Variable	Tag	Value
$junos-cos-scheduler-dropfile-low	T04	d3
$junos-cos-scheduler-dropfile-medium-low	T05	d2
$junos-cos-scheduler-dropfile-medium-high	T06	d1
$junos-cos-scheduler-dropfile-high	T07	d0

Table 77 on page 653 lists the values defined by the RADIUS administrator for the best effort scheduler in the CoA message. The values are the same as the initial service.

Table 77: Initial CoS Values for the Best Effort Scheduler at Subscriber Login

Predefined Variable	Tag	Value
$junos-cos-scheduler	—	be_sch
$junos-cos-scheduler-tx	T01	10
$junos-cos-scheduler-bs	T02	10
$junos-cos-scheduler-pri	T03	low
$junos-cos-scheduler-dropfile-low	T04	d0
$junos-cos-scheduler-dropfile-medium-low	T05	d1
$junos-cos-scheduler-dropfile-medium-high	T06	d2
$junos-cos-scheduler-dropfile-high	T07	d3

Related Documentation

- Changing CoS Services Overview on page 625
- Configuring User-Defined CoS Variables in a Dynamic Service Profile on page 630

Example: Configuring Initial CoS Parameters Dynamically Obtained from RADIUS

The following configuration is an example of a client dynamic profile in which initial CoS parameters are dynamically obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is applied.

For this example, assume that the RADIUS authentication server has been configured with traffic-shaping parameters (at Juniper Networks VSA 26-108) and CoS scheduling and queuing parameters (at Juniper Networks VSA 26–146).

The subscriber interface is a single-unit static gigabit Ethernet VLAN interface on an EQ DPC port:

```
[edit]
interfaces {
  ge-9/0/3 {
    hierarchical-scheduler;
    vlan-tagging;
    unit 100 {
      vlan-id 100;
      family inet {
        address 192.168.32.2/24;
      }
    }
  }
}
```

The client dynamic profile **residential_silver** attaches the traffic-control profile **tcp_1** to the subscriber interface that is defined in the dynamic profile using the **$junos-interface-ifd-name** predefined variable.

```
[edit]
dynamic-profiles {
  residential_silver {
    interfaces {
      “$junos-interface-ifd-name” {
        unit “$junos-underlying-interface-unit” {
          family inet;
        }
      }
    }
    class-of-service {
      interfaces {
        “$junos-interface-ifd-name” {
          unit “$junos-underlying-interface-unit” {
            output-traffic-control-profile tcp_1;
          }
        }
      }
    }
  }
}
```

The traffic-control profile **tcp_1**, references Junos predefined variables to obtain a scheduler-map name and traffic-shaping parameter values from RADIUS when a subscriber logs in. For this example, assume that the RADIUS server replaces the Junos predefined variable **$junos-cos-scheduler-map** scheduler-map name **business_smap_1**. The scheduler map **business_smap_1** is configured in the client dynamic profile:

```
[edit]
dynamic-profiles {
  residential_silver {
    class-of-service {
      traffic-control-profiles {
        tcp_1 {
          scheduler-map “$junos-cos-scheduler-map”; # ’business_smap_1’
          shaping-rate "$junos-cos-shaping-rate";
```

```
            guaranteed-rate "$junos-cos-guaranteed-rate";
            delay-buffer-rate "$junos-cos-delay-buffer-rate";
          }
        }
        scheduler-maps {
          business_smap_1 {
            forwarding-class best-effort scheduler be_sched;
            forwarding-class ef scheduler home_sched
          }
        }
      }
    }
  }
```

A scheduler definition references Junos predefined variables to obtain scheduler configurations from RADIUS when a subscriber logs in. For this example, assume that the RADIUS server provides scheduler configurations for schedulers named **be_sched** and **home_sched**, which are included in the scheduler map **business_smap_1**:

```
[edit]
dynamic-profiles {
  residential_silver {
    class-of-service {
      schedulers {
        “$junos-cos-scheduler” { # ’be_sched’ and ’home_sched’
          transmit-rate "$junos-cos-scheduler-tx";
          buffer-size "$junos-cos-scheduler-bs";
          priority "$junos-cos-scheduler-pri";
          drop-profile-map loss-priority low protocol any drop-profile
            “$junos-cos-scheduler-dropfile-low“;
          drop-profile-map loss-priority medium-low protocol any drop-profile
            “$junos-cos-scheduler-dropfile-medium-low“;
          drop-profile-map loss-priority medium-high protocol any drop-profile
            “$junos-cos-scheduler-dropfile-medium-high“;
          drop-profile-map loss-priority high protocol any drop-profile
            “$junos-cos-scheduler-dropfile-high“;
        }
      }
    }
  }
}
```

Static configurations for CoS consist of configurations for the forwarding classes used in the scheduler map **business_smap_1** and configurations for drop-profile names provided by RADIUS for as part of the scheduler configurations provided (for **be_sched** and **home_sched**) when a subscriber logs in:

```
[edit]
  class-of-service {
    forwarding-classes {
      queue 0 best-effort;
      queue 1 ef;
    }
    drop-profiles {
      . . . configurations_for_drop_profile_names_provided_by_RADIUS . . .
    }
  }
```

```
}
```

Related Documentation

- Activating Subscribers and Managing Services in an Access Network on page 7
- Dynamic Profiles Overview on page 325
- Dynamic Variables Overview on page 327
- Junos Predefined Variables on page 328
- Subscriber Interfaces That Provide Initial CoS Parameters Dynamically Obtained from RADIUS on page 621
- Configuring Initial CoS Parameters Dynamically Obtained from RADIUS on page 629

Example: Providing Unique Rate Configurations for Schedulers in a Dynamic Profile

Combining static and dynamic schedulers in a dynamic profile enables you to provide subscribers with services that have unique scheduler definitions.

In this example, the network administrator configures the data service with a **transmit-rate** that is rate controlled using the **$junos-cos-scheduler-tx** predefined variable. RADIUS dynamically supplies the percentage value for the transmission rate that is specified in the RADIUS VSA to the data scheduler when the subscriber logs in.

For the best-effort service, the network administrator assigns the remaining transmission rate that is available.

```
schedulers {
  data-scheduler {
    transmit-rate percent rate-limit $junos-cos-scheduler-tx;
    buffer-size percent $junos-cos-scheduler-bs;
    priority $junos-cos-scheduler-pri;
    drop-profile-map loss-priority low protocol any drop-profile d0;
    drop-profile-map loss-priority medium-low protocol any drop-profile d1;
    drop-profile-map loss-priority medium-high protocol any drop-profile d2;
    drop-profile-map loss-priority high protocol any drop-profile d3;
    drop-profile-map loss-priority any protocol any drop-profile all;
  }
  best-effort-scheduler {
    transmit-rate remainder;
    buffer-size percent $junos-cos-scheduler-bs;
    priority medium-high;
    drop-profile-map loss-priority low protocol any drop-profile
      $junos-cos-scheduler-dropfile-low;
    drop-profile-map loss-priority medium-low protocol any drop-profile d1;
    drop-profile-map loss-priority medium-high protocol any drop-profile
      $junos-cos-scheduler-dropfile-medium-high;
    drop-profile-map loss-priority high protocol any drop-profile d3;
    drop-profile-map loss-priority any protocol any drop-profile
      $junos-cos-scheduler-dropfile-any;
  }
```

Example: Configuring Aggregate Scheduling of Queues for Residential Subscribers on Static IP Demux Interfaces

In this example, scheduling is configured for a residential subscriber. Each forwarding class represents a multiplay service (voice, video and data), and is equivalent to a queue.

An interface set of IP demux interfaces represents a DSLAM, and provides shaping of subscribers services to a DSLAM aggregate rate.

```
[edit]
interfaces {
    interface-set demux-set {
        interface demux0 {
            unit 0;
            unit 1;
        }
    }
    ge-2/0/1 {
        vlan-tagging;
        unit 1 {
            per-session-scheduler;
            vlan-id 1;
            demux-source inet;
            family inet {
                address 4.4.4.4/24;
            }
        }
    }
    demux0 {
        unit 0 {
            demux-options {
                underlying-interface ge-2/0/1.1;
            }
            family inet {
                address 1.1.1.1/24;
                demux-source {
                    1.1.1.0/24;
                }
            }
        }
        unit 1 {
            demux-options {
                underlying-interface ge-2/0/1.1;
            }
            family inet {
                address 1.1.2.1/24;
                demux-source {
                    1.1.2.0/24;
                }
            }
        }
    }
}
class-of-service {
```

```
    traffic-control-profiles {
      T1 {
        scheduler-map m1;
        shaping-rate 5m;
      }
      T2 {
        shaping-rate 60m;
      }
    }
    interfaces {
      interface-set demux-set {
        output-traffic-control-profile T2;
      }
      demux0 {
        unit 0 {
          output-traffic-control-profile T1;
        }
        unit 1 {
          output-traffic-control-profile T1;
        }
      }
    }
    scheduler-maps {
      m1 {
        forwarding-class best-effort scheduler s0;
        forwarding-class expedited-forwarding scheduler s1;
        forwarding-class assured-forwarding scheduler s2;
        forwarding-class network-control scheduler s3;
      }
    }
    schedulers {
      s0 {
        transmit-rate percent 10;
        buffer-size percent 10;
      }
      s1 {
        transmit-rate percent 20;
        buffer-size percent 20;
      }
      s2 {
        transmit-rate percent 30;
        buffer-size percent 30;
      }
      s3 {
        transmit-rate percent 40;
        buffer-size percent 40;
      }
    }
}
```

Example: Configuring Hierarchical Scheduling and Queuing for a Static PPPoE Subscriber Interface

In this example, the network administrator defines hierarchical queuing and scheduler parameters by configuring traffic control profile and binding it directly to a PPPoE subscriber interface.

This configuration is supported on the IQ2E PIC.

To use this configuration in a broadband access network, each forwarding class can represent one type of services provided to a household customer and is mapped to a queue. Each PPPoE interface represents a household and provides shaping of all household traffic to an aggregate rate. All of the PPPoE interfaces on the physical interfaces are shaped to the underlying physical interface rate.

Table 78 on page 659 lists the scheduler and queue mapping for this configuration.

Table 78: Scheduler Per Logical Interface Mapping

Level	Type	Mapping
4	Queue	PPPoE interface
3	Scheduler	PPPoE interface
2	Scheduler	—
1	Scheduler	Underlying physical interface

```
interfaces {
   ge-3/0/3 {
      hierarchical-scheduler;
      vlan-tagging;
      unit 0 {
         encapsulation ppp-over-ether;
         vlan-id 100;
      }
   }
   pp0 {
      unit 0 {
         pppoe-options {
            underlying-interface ge-3/0/3.0;
            server;
         }
         family inet {
            address 120.20.20.20/32 {
               destination 120.20.20.21;
            }
         }
      }
      unit 1 {
         pppoe-options {
```

```
            underlying-interface ge-3/0/3.0;
            server;
          }
          family inet {
            address 130.30.30.30/32 {
              destination 130.30.30.31;
            }
          }
        }
        unit 2 {
          pppoe-options {
            underlying-interface ge-3/0/3.0;
            server;
          }
          family inet {
            address 140.40.40.40/32 {
              destination 140.40.40.41;
            }
          }
        }
      }
    }
    class-of-service {
      traffic-control-profiles {
        tcp {
          scheduler-map data_smap;
          shaping-rate 50k;
          guaranteed-rate 10k;
        }
      }
      interfaces {
        pp0 {
          unit 0 {
            output-traffic-control-profile tcp;
          }
            unit 1 {
              output-traffic-control-profile tcp;
              unit 2 {
                output-traffic-control-profile tcp;
                }
                }
              }
              forwarding-classes {
                queue 0 be;
                queue 1 ef;
                queue 3 nc;
                queue 2 af;
              }
              scheduler-maps {
                data_smap {
                  forwarding-class be scheduler be_sch;
                }
                voice_data_smap {
                  forwarding-class be scheduler be_sch;
                }
                vid_data_smap {
```

```
        forwarding-class ef scheduler ef_sch;
    }
}
schedulers {
    be_sch {
        transmit-rate percent 10;
        buffer-size remainder;
        priority low;
    }
    ef_sch {
        transmit-rate percent 10;
        buffer-size remainder;
        priority low;
    }
    af_sch {
        transmit-rate percent 10;
        buffer-size remainder;
        priority low;
    }
    nc_sch {
        transmit-rate percent 10;
        buffer-size remainder;
        priority low;
    }
}
```

Related Documentation

- CoS for PPPoE Subscriber Interfaces Overview on page 636
- Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface on page 640

Example: Configuring Hierarchical Scheduling and Queuing for an Underlying Static PPPoE Subscriber Interface

In this example, the network administrator defines hierarchical queues and scheduler parameters by configuring a traffic control profile and binding it directly to a PPPoE subscriber interface. The network administrator then configures the traffic control profile on the underlying interface where a group of PPPoE interfaces reside.

This configuration is supported on the IQ2E PIC.

To use this configuration in a broadband access network, each forwarding class represents one type of services provided to a household customer and is mapped to a queue. Each PPPoE interface represents a household and provides shaping of all household traffic to an aggregate rate. The underlying logical interface where a group of PPPoE interface resides represents a DSLAM and provides shaping to the DSLAM rate.

Table 79 on page 661 lists the scheduler and queue mapping for this configuration.

Table 79: Scheduler Per Underlying Interface Mapping

Level	Type	Mapping
4	Queue	PPPoE interface

Table 79: Scheduler Per Underlying Interface Mapping *(continued)*

Level	Type	Mapping
3	Scheduler	PPPoE interface
2	Scheduler	Underlying logical interface
1	Scheduler	Underlying interface

```
interfaces {
   ge-3/0/3 {
      hierarchical-scheduler;
      vlan-tagging;
      unit 0 {
         encapsulation ppp-over-ether;
         vlan-id 100;
      }
      unit 1 {
         vlan-id 101;
      }
   }
   pp0 {
      hierarchical-scheduler;
      unit 0 {
         pppoe-options {
            underlying-interface ge-3/0/3.0;
            server;
         }
         family inet {
            address 120.20.20.20/32 {
               destination 120.20.20.21;
            }
         }
      }
      unit 1 {
         pppoe-options {
            underlying-interface ge-3/0/3.0;
            server;
         }
         family inet {
            address 130.30.30.30/32 {
               destination 130.30.30.31;
            }
         }
      }
      unit 2 {
         pppoe-options {
            underlying-interface ge-3/0/3.0;
            server;
         }
         family inet {
            address 140.40.40.40/32 {
               destination 140.40.40.41;
            }
```

```
        }
      }
    }
  }
  class-of-service {
    traffic-control-profiles {
      tcp1 {
        scheduler-map data_smap;
        shaping-rate 50k;
        guaranteed-rate 10k;
      }
      tcp2 {
        scheduler-map data_smap;
        shaping-rate 50m;
        guaranteed-rate 10m;
      }
    }
    interfaces {
      pp0 {
        unit 0 {
          output-traffic-control-profile tcp1;
        }
          unit 1 {
            output-traffic-control-profile tcp1;
            }
            unit 2 {
              output-traffic-control-profile tcp1;
              }
              }
              ge-3/0/3 {
                unit 0 {
                  output-traffic-control-profile tcp2;
                }
              }
            }
            ...
          }
```

Related Documentation

- CoS for PPPoE Subscriber Interfaces Overview on page 636
- Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface on page 640

Example: Configuring Hierarchical Scheduling and Queuing for an Interface Set of Static PPPoE Subscriber Interfaces

In this example, the network administrator defines hierarchical queues and scheduler parameters by configuring traffic-control profile and binding it directly to a PPPoE subscriber interface. The network administrator then configures the traffic-control profile on a set of PPPoE interfaces.

This configuration is supported on the IQ2E PIC.

To use this configuration in a broadband access network, each forwarding class represents one type of services provided to a household customer and is mapped to a queue. Each

PPPoE interface represents a household and provides shaping of all household traffic to an aggregate rate. In addition, the PPPoE interface-set configuration provides shaping of traffic for a group of PPPoE interface on a DSLAM to a DSLAM aggregate rate.

Table 80 on page 664 lists the scheduler and queue mapping for this configuration.

Table 80: Scheduler per Logical Interface with Interface Set Mapping

Level	Type	Mapping
4	Queue	PPPoE interface
3	Scheduler	PPPoE interface
2	Scheduler	Set of PPPoE interfaces
1	Scheduler	Underlying physical interface

```
interfaces {
   interface-set iflset1 {
      interface pp0 {
         unit 0;
         unit 1;
         unit 2;
         }
      }
      pp0 {
         unit 0 {
            pppoe-options {
               underlying-interface ge-3/0/3.0;
               server;
            }
            family inet {
               address 120.20.20.20/32 {
                  destination 120.20.20.21;
               }
            }
         }
         unit 1 {
            pppoe-options {
               underlying-interface ge-3/0/3.0;
               server;
            }
            family inet {
               address 130.30.30.30/32 {
                  destination 130.30.30.31;
               }
            }
         }
         unit 2 {
            pppoe-options {
               underlying-interface ge-3/0/3.0;
               server;
            }
```

```
        family inet {
          address 140.40.40.40/32 {
            destination 140.40.40.41;
          }
        }
      }
    }
    ge-3/0/3 {
      hierarchical-scheduler;
      vlan-tagging;
      unit 0 {
        encapsulation ppp-over-ether;
        vlan-id 100;
      }
      unit 1 {
        vlan-id 101;
      }
      unit 2 {
        vlan-id 102;
      }
    }
  }
  class-of-service {
    traffic-control-profiles {
      tcp1 {
        scheduler-map data_smap;
        shaping-rate 50k;
        guaranteed-rate 10k;
      }
      tcp2 {
        scheduler-map data_smap;
        shaping-rate 50m;
        guaranteed-rate 10m;
      }
    }
    interfaces {
      pp0 {
        unit 0 {
          output-traffic-control-profile tcp1;
        }
        unit 1 {
          output-traffic-control-profile tcp1;
        }
        unit 2 {
          output-traffic-control-profile tcp1;
        }
        interface-set iflset1 {
          output-traffic-control-profile tcp2;
        }
        ...
      }
```

Related Documentation

- CoS for PPPoE Subscriber Interfaces Overview on page 636
- Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface on page 640

Example: Configuring a Dynamic Interface Set of VLAN Subscribers

Requirements

This example uses the following hardware and software components:

- Junos OS Release 10.4
- MX Series Router with Trio MPC/MIC interfaces

Overview

In this example, the network administrator groups dynamic VLAN interfaces in an interface set. The interface set is configured in a dynamic profile, and enables hierarchical scheduling for the VLAN interfaces for a multiplay service.

DHCP is used as the access method, and RADIUS is used as the authentication method for the interfaces associated with the interface set.

Configuring the Dynamic VLANs

CLI Quick Configuration

To quickly configure the dynamic VLANs, copy the following commands and paste them into the router terminal window:

```
[edit]
edit dynamic-profiles vlan-prof
edit interfaces $junos-interface-ifd-name unit $junos-interface-unit
set vlan-id $junos-vlan-id
set demux-source inet
set family inet unnumbered-address lo0.0 preferred-source-address 100.20.32.2
top
edit interfaces ge-1/0/0
set hierarchical-scheduler
set vlan-tagging
edit auto-configure vlan-ranges dynamic-profile vlan-prof
set accept inet
set ranges any
top
set interfaces lo0 unit 0 family inet address 100.20.32.2/32
```

Configuring the Dynamic Profile for the Autoconfigured VLANs

Step-by-Step Procedure

In this section, you create a dynamic profile for the VLAN IDs to be automatically assigned when subscribers log in.

To configure the dynamic profile for the VLANs:

1. Configure the dynamic profile.

   ```
   [edit]
   user@host#edit dynamic-profile vlan-prof
   ```

2. Configure the interfaces.

   ```
   [edit dynamic-profiles vlan-prof]
   user@host#edit interfaces $junos-interface-ifd-name unit $junos-interface-unit
   ```

3. Add the VLAN ID variable.

   ```
   [edit dynamic-profiles vlan-prof interfaces $junos-interface-ifd-name unit
     $junos-interface-unit]
   user@host#set vlan-id $junos-vlan-id
   ```

4. Configure the demux source as IPv4.

   ```
   [edit dynamic-profiles vlan-prof interfaces $junos-interface-ifd-name unit
     $junos-interface-unit]
   user@host#set demux-source inet
   ```

5. Configure the family.

   ```
   [edit dynamic-profiles vlan-prof interfaces $junos-interface-ifd-name unit
     $junos-interface-unit]
   user@host#set family inet unnumbered-address lo0.0 preferred-source-address
     100.20.32.2
   ```

Configuring the VLAN Interfaces

Step-by-Step Procedure

To configure the VLAN interfaces:

1. Create the VLAN interface.

   ```
   [edit]
   user@host# edit interfaces ge-1/0/0
   ```

2. Enable hierarchical scheduling.

   ```
   [edit interfaces ge-1/0/0]
   user@host# set hierarchical-scheduler
   ```

3. Configure VLAN tagging.

   ```
   [edit interfaces ge-1/0/0]
   user@host# set vlan-tagging
   ```

4. Configure auto-configuration for the dynamic profile.

   ```
   [edit interfaces ge-1/0/0]
   user@host# edit auto-configure vlan-ranges dynamic-profile vlan-prof
   ```

5. Configure any VLAN ID range.

```
[edit interfaces ge-1/0/0 auto-configure vlan-ranges dynamic-profile vlan-prof]
user@host# set ranges any
```

6. Specify IPv4 traffic for the VLAN.

```
[edit interfaces ge-1/0/0 auto-configure vlan-ranges dynamic-profile vlan-prof]
user@host# set accept inet
```

Configuring the Loopback Interface

Step-by-Step Procedure

To configure the loopback interface:

1. Create the loopback interface.

```
[edit]
user@host# edit interfaces lo0
```

2. Configure the unit and the family.

```
[edit intefaces lo0]
user@host# set unit 0 family inet address 100.20.32.2/32
```

Configuring Dynamic Traffic Scheduling and Shaping

CLI Quick Configuration

To quickly configure the traffic scheduling and shaping parameters, copy the following commands and paste them into the router terminal window:

```
[edit]
edit dynamic-profiles multiplay class-of-service schedulers be_sch
set transmit-rate percent 12
set buffer-size percent 12
set priority low
up
edit ef_sch
set transmit-rate percent 12
set buffer-size percent 12
set priority low
up
edit af_sch
set transmit-rate percent 12
set buffer-size percent 12
set priority low
up
edit nc_sch
set transmit-rate percent 12
set buffer-size percent 12
set priority low
up
edit voice_sch
set transmit-rate percent 12
set buffer-size percent 12
set priority low
up
edit video_sch
set transmit-rate percent 12
set buffer-size percent 12
set priority low
```

```
up
edit game_sch
set transmit-rate percent 12
set buffer-size percent 12
set priority low
up
edit data_sch
set transmit-rate percent 12
set buffer-size percent 12
set priority low
up 2
edit scheduler-maps all_smap
set forwarding-class be scheduler be_sch
set forwarding-class ef scheduler ef_sch
set forwarding-class af scheduler af_sch
set forwarding-class nc scheduler nc_sch
set forwarding-class voice scheduler voice_sch
set forwarding-class video scheduler video_sch
set forwarding-class game scheduler game_sch
set forwarding-class data scheduler data_sch
up 2
edit traffic-control-profiles multiplay
set scheduler-map all_smap
set shaping-rate 100m
set guaranteed-rate 100m
```

Configuring the Schedulers in the Dynamic Profile

Step-by-Step Procedure

In this section, you create a dynamic profile for the multiplay service and configure scheduling and shaping.

To configure the schedulers:

1. Create the **multiplay** dynamic profile.

   ```
   [edit]
   user@host# edit dynamic-profiles multiplay
   ```

2. Configure the best effort scheduler.

   ```
   [edit dynamic-profiles multiplay class-of-service schedulers]
   user@host# edit be_sch
   user@host# set transmit-rate percent 12
   user@host# set buffer-size percent 12
   user@host# set priority low
   ```

3. Configure the expedited forwarding scheduler.

   ```
   [edit dynamic-profiles multiplay class-of-service schedulers]
   user@host# edit ef_sch
   user@host# set transmit-rate percent 12
   user@host# set buffer-size percent 12
   user@host# set priority low
   ```

4. Configure the assured forwarding scheduler.

   ```
   [edit dynamic-profiles multiplay class-of-service schedulers]
   user@host# edit af_sch
   ```

```
user@host# set transmit-rate percent 12
user@host# set buffer-size percent 12
user@host# set priority low
```

5. Configure the network control scheduler.

```
[edit dynamic-profiles multiplay class-of-service schedulers]
user@host# edit nc_sch
user@host# set transmit-rate percent 12
user@host# set buffer-size percent 12
user@host# set priority low
```

6. Configure the voice scheduler.

```
[edit dynamic-profiles multiplay class-of-service schedulers]
user@host# edit voice_sch
user@host# set transmit-rate percent 12
user@host# set buffer-size percent 12
user@host# set priority low
```

7. Configure the video scheduler.

```
[edit dynamic-profiles multiplay class-of-service schedulers]
user@host# edit video_sch
user@host# set transmit-rate percent 12
user@host# set buffer-size percent 12
user@host# set priority low
```

8. Configure the gaming scheduler.

```
[edit dynamic-profiles multiplay class-of-service schedulers]
user@host# edit game_sch
user@host# set transmit-rate percent 12
user@host# set buffer-size percent 12
user@host# set priority low
```

9. Configure the data scheduler.

```
[edit dynamic-profiles multiplay class-of-service schedulers]
user@host# edit data_sch
user@host# set transmit-rate percent 12
user@host# set buffer-size percent 12
user@host# set priority low
```

Configuring the Scheduler Map in the Dynamic Profile

Step-by-Step Procedure

To configure the scheduler map:

1. Configure the scheduler map for all of the services.

```
[edit dynamic-profiles multiplay class-of-service]
user@host# edit scheduler-maps all_smap
```

2. Configure the forwarding classes for each service in the scheduler map.

```
[edit dynamic-profiles multiplay class-of-service scheduler-maps all_smap]
user@host# set forwarding-class be scheduler be_sch
user@host# set forwarding-class ef scheduler ef_sch
user@host# set forwarding-class af scheduler af_sch
user@host# set forwarding-class nc scheduler nc_sch
user@host# set forwarding-class voice scheduler voice_sch
```

```
user@host# set forwarding-class video scheduler video_sch
user@host# set forwarding-class game scheduler game_sch
user@host# set forwarding-class data scheduler data_sch
```

Configuring the Traffic-Control Profile in the Dynamic Profile

Step-by-Step Procedure

To configure the traffic-control profile the interface set:

1. Configure the traffic-control profile.

   ```
   [edit dynamic-profiles multiplay class-of-service]
   user@host# edit traffic control-profiles multiplay
   ```

2. Configure the scheduler map.

   ```
   [edit dynamic-profiles multiplay class-of-service traffic control-profiles multiplay]
   user@host# set scheduler-map all_smap
   ```

3. Configure the shaping rate.

   ```
   [edit dynamic-profiles multiplay class-of-service traffic control-profiles multiplay]
   user@host# set shaping-rate 100m
   ```

4. Configure the guaranteed rate.

   ```
   [edit dynamic-profiles multiplay class-of-service traffic control-profiles multiplay]
   user@host# set guaranteed-rate 20m
   ```

Configuring the Interface Set in the Dynamic Profile

CLI Quick Configuration

To quickly configure the interface set, copy the following commands and paste them into the router terminal window:

```
[edit]
edit dynamic-profiles multiplay
edit interfaces interface-set $junos-interface-set-name
set interface $junos-interface-ifd-name unit $junos-underlying-interface-unit
top
edit class-of-service interfaces interface-set
set output-traffic-control-profile multiplay
```

Configuring the Interfaces for the Interface Set

Step-by-Step Procedure

To configure the interface variable for the interface set:

1. Configure the dynamic profile for the interface set.

   ```
   [edit]
   user@host#edit dynamic-profiles multiplay
   ```

2. Configure the interface using the Junos predefined variable.

   ```
   [edit dynamic-profiles multiplay]
   user@host#edit interfaces $junos-interface-ifd-name unit
     $junos-underlying-interface-unit
   ```

3. Configure the family.

   ```
   [edit dynamic-profiles multiplay interfaces $junos-interface-set-name unit
     $junos-underlying-interface-unit]
   ```

```
user@host#set family inet unnumbered-address lo0.0 preferred-source-address
  100.20.32.2
```

Configuring the Interface Set

Step-by-Step Procedure

To configure the interface set:

1. Configure the interface set using the Junos predefined variable.

   ```
   [edit dynamic-profiles multiplay]
   user@host#edit interfaces interface-set $junos-interface-set-name
   ```

2. Add the dynamic VLAN interfaces to the interface set.

   ```
   [edit dynamic-profiles multiplay interfaces $junos-interface-set-name]
   user@host#set interface $junos-interface-ifd-name unit
     $junos-underlying-interface-unit
   ```

Applying the Traffic Control Profile to the Interface Set

Step-by-Step Procedure

You apply the traffic control profile outside of the dynamic profile, in the **[edit class-of-service]** hierarchy.

To apply the traffic-control profile:

1. Specify the interface set to which you want to apply the traffic control profile.

   ```
   [edit class-of-service]
   user@host#edit interfaces interface-set dynamic-set
   ```

2. Attach the output-traffic control profile defined in the dynamic profile to the interface set.

   ```
   [edit class-of-service interfaces]
   user@host#set output-traffic-control-profile multiplay
   ```

Configuring DHCP Access

CLI Quick Configuration

To quickly configure DHCP access, copy the following commands and paste them into the router terminal window:

```
[edit]
edit system services dhcp-local-server authentication
set password multiplay
set username-include user-prefix multiplay
up 1
set dynamic-profile dhcp-vlan-prof aggregate-clients replace
set group vlans interface ge-1/0/0
top
edit access address-assignment pool v4 family inet
set network 100.20.0.0/16
set range limited low 100.20.0.10
set range limited high 100.20.128.250
set dhcp-attributes maximum-lease-time 84600
```

Configuring the DHCP Local Server

Step-by-Step Procedure

To configure DHCP access:

1. Configure the DHCP local server.

   ```
   [edit system]
   user@host# edit services dhcp-local-server authentication
   ```

2. Set the password.

   ```
   [edit system services dhcp-local-server authentication]
   user@host# set password multiplay
   ```

3. Specify that you want to include optional information in the username.

   ```
   [edit system services dhcp-local-server authentication]
   user@host# set username-include user-prefix multiplay
   ```

4. Attach the dynamic profile with the interface set.

   ```
   [edit system services dhcp-local-server]
   user@host# set dynamic-profile dhcp-vlan-prof aggregate-clients replace
   ```

5. Configure a group for the VLAN interface.

   ```
   [edit system services dhcp-local-server]
   user@host# set group vlans interface ge-1/0/0
   ```

Configuring Address Assignment Pools

Step-by-Step Procedure

To configure address assignment pools:

1. Configure the pool of IPv4 addresses.

   ```
   [edit access]
   user@host#edit address-assignment pool v4 family inet
   ```

2. Configure the family of interfaces in the pool.

   ```
   [edit access address-assignment pool v4]
   user@host#set network 100.20.0.0/16
   ```

3. Configure the upper and lower bounds of the address range.

   ```
   [edit access address-assignment pool v4]
   user@host#set range limited low 100.20.0.10
   user@host#set range limited high 100.20.128.250
   ```

4. Configure the maximum length of time in seconds for which a subscriber can request and hold a lease.

   ```
   [edit access address-assignment pool v4]
   user@host#set dhcp-attributes maximum-lease-time 84600
   ```

Configuring RADIUS Authentication

CLI Quick Configuration

To quickly configure RADIUS authentication, copy the following commands and paste them into the router terminal window:

```
[edit]
```

```
edit access radius-server 172.28.30.108
set secret $9$1u5ErvW87bwgSr4Zji5T
set timeout 5
set retry 5
up 2
edit profile acc-prof
set authentication-order radius
set radius authentication-server 172.28.30.108
```

Configuring RADIUS Access

Step-by-Step Procedure

To configure RADIUS access:

1. Configure the RADIUS server.

   ```
   [edit access]
   user@host#edit radius-server 172.28.30.108
   ```

2. Configure the required secret (password) that the local router or switch passes to the RADIUS client.

   ```
   [edit access radius-server 172.28.30.108]
   user@host# set secret $9$1u5ErvW87bwgSr4Zji5T
   ```

3. Configure the length of time that the local router or switch waits to receive a response from a RADIUS server.

   ```
   [edit access radius-server 172.28.30.108]
   user@host# set timeout 5
   ```

4. Configure the number of times that the router or switch attempts to contact a RADIUS accounting server.

   ```
   [edit access radius-server 172.28.30.108]
   user@host# set retry 5
   ```

5. Configure the access profile.

   ```
   [edit access]
   user@host#edit profile acc-prof
   ```

6. Configure the authentication order.

   ```
   [edit access profile acc-prof ]
   user@host# set authentication-order radius
   ```

7. Configure the authentication server.

   ```
   [edit access profile acc-prof]
   user@host#set radius authentication-server 172.28.30.108
   ```

Results

```
dynamic-profiles {
  vlan-prof {
    interfaces {
      “$junos-interface-ifd-name” {
        unit "$junos-interface-unit" {
          vlan-id "$junos-vlan-id";
          demux-source inet;
          family inet {
            unnumbered-address lo0.0 preferred-source-address 100.20.32.2;
```

```
        }
      }
    }
  }
}
multiplay {
  class-of-service {
    traffic-control-profiles {
      multiplay {
        scheduler-map all_smap;
        shaping-rate 100m;
        guaranteed-rate 20m;
      }
    }
    interfaces {
        interface-set “$junos-interface-set-name” {
          interface “$junos-interface-ifd-name” {
            unit “$junos-underlying-interface-unit”;
          }
        }
      “$junos-interface-ifd-name” {
        unit "$junos-interface-unit" {
          output-traffic-control-profile multiplay;
        }
      }
    }
    scheduler-maps {
      all_smap {
        forwarding-class be scheduler be_sch;
        forwarding-class ef scheduler ef_sch;
        forwarding-class af scheduler af_sch;
        forwarding-class nc scheduler nc_sch;
        forwarding-class voice scheduler voice_sch;
        forwarding-class video scheduler video_sch;
        forwarding-class game scheduler game_sch;
        forwarding-class data scheduler data_sch;
      }
    }
    schedulers {
      be_sch {
        transmit-rate percent 12;
        buffer-size percent 12;
        priority low;
      }
      ef_sch {
        transmit-rate percent 12;
        buffer-size percent 12;
        priority low;
      }
      af_sch {
        transmit-rate percent 12;
        buffer-size percent 12;
        priority low;
      }
      nc_sch {
        transmit-rate percent 12;
```

```
            buffer-size percent 12;
            priority low;
        }
        voice_sch {
            transmit-rate percent 12;
            buffer-size percent 12;
            priority low;
        }
        video_sch {
            transmit-rate percent 12;
            buffer-size percent 12;
            priority low;
        }
        game_sch {
            transmit-rate percent 12;
            buffer-size percent 12;
            priority low;
        }
        data_sch {
            transmit-rate percent 12;
            buffer-size percent 12;
            priority low;
        }
    }
    }
}
access {
    radius-server {
        172.28.30.108 {
            secret "$9$1u5ErvW87bwgSr4Zji5T"; ## SECRET-DATA
            timeout 5;
            retry 5;
        }
    }
    profile acc-prof {
        authentication-order radius;
        radius {
            authentication-server 172.28.30.108;
        }
    }
    address-assignment {
        pool v4 {
            family inet {
                network 100.20.0.0/16;
                range limited {
                    low 100.20.0.10;
                    high 100.20.128.250;
                }
                dhcp-attributes {
                    maximum-lease-time 84600;
                }
            }
        }
    }
}
class-of-service {
```

```
        interfaces {
          interface-set dynamic-set {
            output-traffic-control-profile multiplay;
          }
        }
      }
      interfaces {
        interface-set “$junos-interface-set-name” {
          interface "$junos-interface-ifd-name" {
            unit "$junos-underlying-interface-unit";
          }
        }
        "$junos-interface-ifd-name" {
          unit "$junos-underlying-interface-unit" {
            family inet {
              unnumbered-address lo0.0 preferred-source-address 100.20.32.2;
            }
          }
        }
      }
    }
  }
  interfaces {
    ge-1/0/0 {
      hierarchical-scheduler;
      vlan-tagging;
      auto-configure {
        vlan-ranges {
          dynamic-profile vlan-prof {
            accept inet;
            ranges {
              any;
            }
          }
        }
      }
    }
    lo0 {
      unit 0 {
        family inet {
          address 100.20.32.2/32;
        }
      }
    }
  }
  system {
    services {
      dhcp-local-server {
        authentication {
          password multiplay;
          username-include {
            user-prefix multiplay;
          }
        }
        dynamic-profile multiplay aggregate-clients replace;
        group vlans {
```

```
            interface ge-1/0/0.0;
        }
    }
}
}
```

Verification

To confirm that the configuration is correct, perform these tasks:

- Verifying the Interfaces that are Included in the Interface Set on page 678
- Verifying the Traffic Scheduling and Shaping Parameters for the Interface Set on page 678

Verifying the Interfaces that are Included in the Interface Set

Purpose Verify the interfaces included in the interface set.

Action `user@host>` **show interfaces interface-set dynamic-set terse**

Verifying the Traffic Scheduling and Shaping Parameters for the Interface Set

Purpose Verify that the traffic scheduling and shaping parameters are applied properly to an interface included in the interface set.

Action `user@host>` **show class-of-service interface**

Related Documentation

- Configuring an Interface Set of Subscribers in a Dynamic Profile on page 644

CHAPTER 67

Bandwidth Management for Dynamic CoS Overview

Bandwidth Management for Downstream Traffic in Edge Networks Overview

In a subscriber access network, traffic with different encapsulations can be passed downstream to other customer premise equipment (CPE) through the MX Series router. Managing the bandwidth of downstream ATM traffic to Ethernet interfaces can be especially difficult because of the different Layer 2 encapsulations.

The *overhead accounting* feature enables you to shape traffic based on either frames or cells and assign a byte adjustment value to account for different encapsulations.

This feature is available on Trio MPC/MIC interfaces on MX Series routers.

Guidelines for Configuring the Shaping Mode

Frame mode is useful for adjusting downstream traffic with different encapsulations. In frame shaping mode, shaping is based on the number of bytes in the frame, without regard to cell encapsulation or padding overhead. Frame is the default shaping mode on the router.

Cell mode is useful for adjusting downstream cell-based traffic. In cell shaping mode, shaping is based on the number of bytes in cells, and accounts for the cell encapsulation and padding overhead.

When you specify cell mode, the resulting traffic stream conforms to the policing rates configured in downstream ATM switches, reducing the number of packet drops in the Ethernet network.

To account for ATM segmentation, the MX Series router adjusts all of the rates by 48/53 to account for ATM AAL5 encapsulation. In addition, the router accounts for cell padding, and internally adjusts each frame by 8 bytes to account for the ATM trailer.

Guidelines for Configuring Byte Adjustments

When the downstream traffic has different byte sizes per encapsulation, it is useful to configure a *byte adjustment* value to adjust the frame sizes. For example, you can configure the frame shaping mode and a byte adjustment value to account for differences in Layer 2 protocols for downstream Ethernet traffic.

We recommend that you specify a byte adjustment value that represents the difference between the CPE protocol overhead and B-RAS protocol overhead.

The system rounds up the byte adjustment value to the nearest multiple of 4. For example, a value of 6 is rounded to 8, and a value of –10 is rounded to –8.

You do not need to configure a byte adjustment value to account for the downstream ATM network. However, you could specify the byte value to account for additional encapsulations or decapsulations in the downstream network.

Relationship with Other CoS Features

Enabling the overhead accounting feature affects the resulting shaping rates, guaranteed rate, and excess rate parameters, if they are configured.

The overhead accounting feature also affects the egress shaping overhead feature that you can configure at the chassis level. We recommend that you use the egress shaping-overhead feature to account for the Layer 2 overhead of the outgoing interface, and use the overhead-accounting feature to account for downstream traffic with different encapsulations and cell-based networks.

When both features are configured together, the total byte adjustment value is equal to the adjusted value of the overhead-accounting feature plus the value of the egress-shaping-overhead feature. For example, if the configured byte adjustment value is 40, and the router internally adjusts the size of each frame by 8, the adjusted overhead accounting value is 48. That value is added to the egress shaping overhead of 30 for a total byte adjustment value of 78.

Related Documentation

- To configure overhead accounting for static Ethernet interfaces, see Configuring Static Shaping Parameters to Account for Overhead in Downstream Traffic Rates
- To configure overhead accounting for dynamic subscriber access, see Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 688

Dedicated Queue Scaling for CoS Configurations on Trio MPC/MIC Interfaces Overview

The 30-Gigabit Ethernet Queuing and 60-Gigabit Ethernet Queuing and Enhanced Queuing Ethernet Modular Port Concentrator (MPC) modules provide a set of dedicated queues for subscriber interfaces configured with hierarchical scheduling or per-unit scheduling.

The dedicated queues offered on these modules enable service providers to reduce costs through different scaling configurations. For example, the 60-Gigabit Ethernet Enhanced Queuing MPC module enables service providers to reduce the cost per subscriber by allowing many subscriber interfaces to be created with four or eight queues. Alternatively, the 30-Gigabit Ethernet and 60-Gigabit Ethernet Queuing MPC modules enable service providers to reduce hardware costs, but allow fewer subscriber interfaces to be created with four or eight queues.

This topic describes the overall queue, scheduler node, and logical interface scaling for subscriber interfaces created on these Trio MPC/MIC module combinations.

Queue Scaling for Trio MPC/MIC Interfaces

Table 81 on page 681 lists the number of dedicated queues and number of subscribers supported per Trio MPC module.

Table 81: Dedicated Queues for Trio MPC/MIC Interfaces

MPC	Dedicated Egress Queues	Supported Subscriber Interfaces	Logical Interfaces with 4 Queues	Logical Interfaces with 8 Queues
30-Gigabit Ethernet Queuing MPC	64,000	16,000	16,000 (8000 per PIC)	8000 (4000 per PIC)
60-Gigabit Ethernet Queuing MPC	128,000	32,000	32,000 (8000 per PIC)	16,000 (4000 per PIC)
60-Gigabit Ethernet Enhanced Queuing MPC	512,000	64,000	64,000 (16,000 per PIC)	64,000 (16,000 per PIC)

Each interface-set uses 8 queues from total available egress queues.

Management of Dedicated and Remaining Queues

An SNMP trap is generated to notify you when the number of available dedicated queues on the module drops below 10 percent.

When the maximum number of dedicated queues on the Trio MPC modules is reached, a system log message, **COSD_OUT_OF_DEDICATED_QUEUES**, is generated. The system does not provide subsequent subscriber interfaces with a dedicated set of queues. For per-unit scheduling configurations, there are no configurable queues remaining on the module.

For hierarchical scheduling configurations, remaining queues are available when the number of dedicated queues is reached on the module. Traffic from these logical interfaces are considered unclassified and attached to a common set of queues that are shared by all subsequent logical interfaces. These common queues are the default port queues that are created for every port. You can configure a traffic control profile and attach that to the interface to provide CoS parameters for the remaining queues.

For example, when the 30-Gigabit Ethernet Queuing MPC is configured with 32,000 subscriber interfaces with four queues per subscriber, the module can support 16,000 subscribers with a dedicated set of queues. You can provide CoS shaping and scheduling parameters to the remaining queues for those subscriber interfaces by attaching a special traffic-control profile to the interface.

These subscriber interfaces remain with this traffic control profile, even if dedicated queues become available.

Related Documentation

- For information about managing dedicated queues in a static CoS configuration, see Managing Dedicated and Remaining Queues for Static CoS Configurations on Trio MPC/MIC Interfaces
- For information about managing dedicated queues in a dynamic subscriber access configuration, see Managing Dedicated and Remaining Queues for Dynamic CoS Configurations on Trio MPC/MIC Interfaces on page 689
- Scheduler Node Scaling on the Trio MPC/MIC Overview
- COSD System Log Messages

Hierarchical CoS Shaping-Rate Adjustments Overview

This overview describes how MX Series Ethernet Services Routers installed as a an edge router in a subscriber access network can adjust hierarchical class-of-service (CoS) policy to prevent bandwidth contention at subscriber interfaces on Enhanced Queuing Dense Port Concentrator (EQ DPC) ports and the Trio MPC/MIC family of products.

Hierarchical, per-subscriber CoS is supported only for subscriber interfaces on EQ DPC or Trio MPC/MIC interfaces operating in hierarchical scheduler mode. These types of subscriber interfaces can be static VLAN interfaces or static interface sets. Hierarchical CoS enables you to apply traffic shaping parameters (which can include a delay-buffer bandwidth) and packet transmission scheduling parameters (which can include buffer management parameters) to an individual subscriber interface rather than to all interfaces configured on the port.

The characteristics of voice, data, and video applications vary widely in their requirements for traffic throughput, bandwidth management, delay and jitter tolerance, and buffer depth. To enhance the flexibility of the hierarchical CoS implementation in a subscriber access network, you can configure the MX Series router to perform real-time adjustments to the shaping rate configured for subscriber interfaces for residential gateways. Enabling a shaping-rate adjustment option on the router can prevent bandwidth contention at the interface from causing degradation of the subscriber's voice, data, or video services.

Related Documentation

- CoS Shaping-Rate Adjustments for Subscriber Local Loops Overview on page 683
- Guidelines for Configuring CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 684
- Enabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 691
- Disabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 696

- Disabling Hierarchical Bandwidth Adjustment for Subscriber Interfaces with Reverse-OIF Mapping on page 697
- Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 702

CoS Shaping-Rate Adjustments for Subscriber Local Loops Overview

This overview describes how an MX Series Ethernet Services Router installed as an edge router can adjust hierarchical CoS policy for subscriber interfaces for subscriber local loops. You can configure the router to throttle the traffic sent to subscriber local loops so that the traffic does not exceed the current data transmission rate of those lines. This feature ensures that changes to subscriber local loop speeds do not cause bandwidth contention at the subscriber's residential gateway.

In a typical subscriber access network, traffic destined to a subscriber is delivered from the access network, through an edge router, to a DSLAM. The DSLAM multiplexes subscriber traffic through a DSL, also known as a *local loop*, to the subscriber's residential gateway. When line noise or cross talk in a subcarrier causes the error rate on a DSL to exceed a certain threshold, the DSLAM can adapt itself by lowering the data transmission rate to that carrier device. A lower data transmission rate is less susceptible to induced errors.

You can configure an MX Series router to adjust the configured shaping rates on scheduler nodes for subscriber interfaces that represent subscriber local loops. Whenever a DSLAM resynchronizes a subscriber local loop speed, the router adjusts the configured shaping rate for that line so that the aggregate egress traffic to those subscribers is shaped to the local loop speed before the traffic reaches the DSLAM. Unless the maximum amount of bandwidth allocated to the subscriber interface on the router is throttled to the local loop speed, bandwidth contention can occur at the subscriber's residential gateway, which can cause the DSLAM to drop packets. This type of shaping-rate adjustment requires the topology discovery and traffic-monitoring features of the Access Node Control Protocol (ANCP).

You can configure ANCP to communicate the subscriber local loop speed to the MX Series router, which in turn throttles traffic destined to the associated subscriber interface so that it matches the subscriber local loop speed. ANCP acquires subscriber line rate information from DSLAMs and then communicates this data transmission rate for use with CoS.

For more information about the ANCP protocol, see the "ANCP Topology Discovery and Traffic Monitoring Overview" on page 709.

Related Documentation

- Hierarchical CoS Shaping-Rate Adjustments Overview on page 682
- Guidelines for Configuring CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 684
- Enabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 691
- Disabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 696

Guidelines for Configuring CoS Shaping-Rate Adjustments for Subscriber Local Loops

These guidelines apply to configuring an MX Series Ethernet Services Router installed as an edge router to adjust the configured shaping rates on scheduler nodes for subscriber interfaces that represent subscriber local loops. This shaping-rate feature uses the topology discovery and traffic-monitoring features of the ANCP.

When you enhance hierarchical CoS policy by configuring ANCP-driven shaping-rate adjustments, consider the following guidelines:

- Shaping-rate adjustments are supported on EQ DPCs and Trio MPC/MIC interfaces on MX Series routers.
- Shaping-rate adjustments are supported only for subscriber local loops that terminate at DSLAMs that you have configured as ANCP neighbors of the MX Series router.
- Shaping-rate adjustments are supported only for scheduler nodes for which you have configured an initial shaping rate by including the **shaping-rate** statement in a traffic-control profile applied to the scheduler node. Specify the initial shaping rate as a peak rate, in bits per second (bps), and not as a percentage. Other methods of configuring a shaping rate are not supported with this feature.
- Shaping-rate adjustments are supported only for scheduler nodes that are static logical interface sets that you have configured to operate at Level 3 of the scheduler hierarchy on the router. If an interface set is configured with a logical interface (such as unit 0) and queue, then the interface-set is an internal scheduler node (as opposed to a root node or a leaf node) at Level 2 of the hierarchy. However, if there are no traffic control profiles configured on logical interfaces in an interface set, then the interface set is an internal scheduler node at Level 3 of the hierarchy.
- Shaping-rate adjustments are supported only for subscriber interfaces over physical interfaces that you have configured to operate in hierarchical scheduler mode. Only ports on EQ DPCs in MX Series routers support hierarchical scheduler mode.
- After shaping-rate adjustments are enabled and the router has performed shaping-rate adjustments on a scheduler node, you can configure a new shaping rate by including the **shaping-rate** statement in a traffic-control profile and then applying that profile to that scheduler node. However, this new shaping-rate value does not immediately result in shaping traffic at the new rate. The scheduler node continues to be shaped at rate set by ANCP. Only when the ANCP shaping-rate adjustment feature is disabled is the scheduler node shaped at the newly configured shaping-rate.
- The Layer 2 Tunneling Protocol (L2TP) is often used to carry traffic securely between an L2TP Network Server (LNS) and an L2TP Access Concentrator (LAC). The QoS adjustment feature supports the shaping overhead options that you can use to add a specified number of bytes to the actual packet length when determining shaped session packet length. ANCP shaping-rate adjustments are not supported for ingress traffic, only for egress traffic. To configure the number of bytes to add to the packet at the

egress side of the tunnel, include the **egress-shaping-overhead** and **mode** statements at the **[edit chassis fpc *slot-number* pic *pic-number* traffic-manager]** hierarchy level. Use the shaping overhead options if you need to account for encapsulation overhead.

For more information about the ANCP protocol, see the "ANCP Topology Discovery and Traffic Monitoring Overview" on page 709.

Related Documentation

- Hierarchical CoS Shaping-Rate Adjustments Overview on page 682
- CoS Shaping-Rate Adjustments for Subscriber Local Loops Overview on page 683
- Enabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 691
- Disabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 696
- Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 702

CHAPTER 68

Configuring Bandwidth Management Parameters for Dynamic CoS

Managing Excess Bandwidth Distribution for Dynamic CoS

Service providers often used tiered services that must utilize excess bandwidth as traffic patterns vary. By default, excess bandwidth between a configured guaranteed rate and shaping rate is shared equally among all queues with the same excess priority value, which might not be optimal for all subscribers to a service.

This feature is supported for Trio MPC/MIC interfaces on MX Series routers.

To configure parameters to manage excess bandwidth for subscriber interfaces:

1. Configure the parameters for the interface.
   a. Configure the shaping rate.

      [edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles *profile-name*]
      user@host# **set shaping-rate (*rate* | $junos-cos-shaping-rate)**

   b. Configure the excess rate.

```
[edit dynamic-profiles profile-name class-of-service traffic-control-profiles
  profile-name]
user@host# set excess-rate (percent percentage | proportion value | percent
  $junos-cos-excess-rate)
```

2. (Optional) Configure parameters for the queue.

   a. Configure the shaping rate.

   ```
   [edit dynamic-profiles profile-name class-of-service scheduler scheduler-name]
   user@host#set shaping-rate (rate | $junos-cos-scheduler-shaping-rate)
   ```

   b. Configure the excess rate.

   ```
   [edit dynamic-profiles profile-name class-of-service scheduler scheduler-name]
   user@host#set excess-rate (percent percentage | percent
     $junos-cos-scheduler-excess-rate)
   ```

   c. Configure the excess priority for a queue.

   ```
   [edit dynamic-profiles profile-name class-of-service scheduler scheduler-name]
   user@host#set excess-priority (low | high | $junos-cos-scheduler-excess-priority)
   ```

Related Documentation

- For hardware requirements and configuration guidelines, see Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592

Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates

You can configure the overhead accounting feature to shape downstream traffic based on either frames or cells.

You can also account for the different byte sizes per encapsulation by configuring a byte adjustment value for the shaping mode.

This feature is supported on Trio MPC/MIC interfaces on MX Series routers.

To configure the overhead accounting feature in a dynamic profile:

1. Do one of the following to configure the shaping mode:

   - Specify the shaping mode.

     Frame shaping mode is enabled by default.

     ```
     [edit dynamic-profiles profile-name class-of-service traffic-control-profiles
       profile-name
     user@host#set overhead-accounting (frame-mode | cell-mode)
     ```

   - Configure a variable for the shaping mode.

     ```
     [edit dynamic-profiles profile-name class-of-service traffic-control-profiles
       profile-name
     user@host#set overhead-accounting $junos-cos-shaping-mode
     ```

2. (Optional) Do one of the following to configure the byte adjustment value:

- Specify a byte adjustment value.

  [edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles *profile-name*
  user@host#**set overhead-accounting bytes *byte-value***

- Configure a variable for the byte adjustment.

  [edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles *profile-name*
  user@host#**set overhead-accounting bytes $junos-cos-byte-adjust**

BEST PRACTICE: We recommend that you specify a byte adjustment value that represents the difference between the customer premise equipment (CPE) protocol overhead and B-RAS protocol overhead.

The available range is –120 through 124 bytes. The system rounds up the byte adjustment value to the nearest multiple of 4. For example, a value of 6 is rounded to 8, and a value of -10 is rounded to -8.

Related Documentation

- Bandwidth Management for Downstream Traffic in Edge Networks Overview on page 679
- Example: Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 699
- Verifying the Scheduling and Shaping Configuration for Subscriber Access on page 619

Managing Dedicated and Remaining Queues for Dynamic CoS Configurations on Trio MPC/MIC Interfaces

This topic describes how to manage dedicated and remaining queues for static and dynamic subscriber interfaces configured in dynamic profiles.

You manage queues at the chassis and physical port level in the static configuration hierarchies, then configure dynamic scheduling and shaping parameters for the subscriber interfaces in the dynamic profile.

- Configuring the Maximum Number of Queues for Trio MPC/MIC Interfaces on page 689
- Configuring Remaining Common Queues on Trio MPC/MIC Interfaces on page 690

Configuring the Maximum Number of Queues for Trio MPC/MIC Interfaces

30-Gigabit Ethernet Queuing Trio MPC modules and 40-Gigabit Ethernet Queuing and Enhanced Queuing Trio MPC modules support a dedicated number of queues when configured for hierarchical scheduling and per-unit scheduling configurations.

To scale the number of subscriber interfaces per queue, you can modify the number of queues supported on the Trio MIC.

To configure the number of queues:

1. Specify that you want to configure the MIC.

   user@host# **edit chassis fpc** *slot-number* **pic** *pic-number*

2. Configure the number of queues.

   [edit chassis fpc *slot-number* pic *pic-number*]
   user@host# **set max-queues-per-interface (8 | 4)**

Configuring Remaining Common Queues on Trio MPC/MIC Interfaces

30-Gigabit Ethernet Queuing Trio MPC modules and 40-Gigabit Ethernet Queuing and Enhanced Queuing Trio MPC modules support a dedicated set of queues when configured with hierarchical scheduling.

When the number of dedicated queues is reached on the module, there can be queues remaining. Traffic from these logical interfaces are considered unclassified and attached to a common set of queues that are shared by all subsequent logical interfaces.

You can configure traffic shaping and scheduling resources for the remaining queues by attaching a special traffic-control-profile to the interface. This feature enables you to provide the same shaping and scheduling to remaining queues as the dedicated queues.

To configure the remaining queues on a Trio MPC/MIC interface:

1. Configure CoS parameters in a traffic-control profile.

   [edit class-of-service]
   user@host# **edit traffic-control-profiles** *profile-name*

2. Enable hierarchical scheduling for the interface.

   [edit interfaces *interface-name*]
   user@host# **set hierarchical-scheduler**

3. Attach the traffic control profiles for the dedicated and remaining queues to the port on which you enabled hierarchical scheduling.

   To provide the same shaping and scheduling parameters to dedicated and remaining queues, reference the same traffic-control profile.

   a. Attach the traffic-control profile for the dedicated queues on the interface.

      [edit class-of-service interfaces *interface-name*]
      user@host# **set output-traffic-control-profile** *profile-name*

   b. Attach the traffic-control profile for the remaining queues on the interface.

      [edit class-of-service interfaces *interface-name*]
      user@host# **set output-traffic-control-profile-remaining** *profile-name*

Related Documentation

- Verifying the Number of Dedicated Queues Configured on Trio MPC/MIC Interfaces on page 691
- Dedicated Queue Scaling for CoS Configurations on Trio MPC/MIC Interfaces Overview on page 680

- Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 601
- Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 603

Verifying the Number of Dedicated Queues Configured on Trio MPC/MIC Interfaces

Purpose Display the number of dedicated queue resources that are configured for the logical interfaces on a port.

Action

```
user@host#show class-of-service interface ge-1/1/0
Physical interface: ge-1/1/0, Index: 166
Queues supported: 4, Queues in use: 4
Total non-default queues created: 4
  Scheduler map: <default>, Index: 2
  Chassis scheduler map: <default-chassis>, Index: 4

  Logical interface: ge-1/1/0.100, Index: 72, Dedicated Queues: no
    Shaping rate: 32000
    Object              Name                    Type                  Index
    Scheduler-map       <remaining>                                   0
    Classifier          ipprec-compatibility    ip                    13

  Logical interface: ge-1/1/0.101, Index: 73, Dedicated Queues: no
    Shaping rate: 32000
    Object              Name                    Type                  Index
    Scheduler-map       <remaining>                                   0
    Classifier          ipprec-compatibility    ip                    13

  Logical interface: ge-1/1/0.102, Index: 74, Dedicated Queues: yes
    Shaping rate: 32000
    Object                   Name               Type                  Index
    Traffic-control-profile  <control_tc_prof>  Output                45866
```

Related Documentation

- Managing Dedicated and Remaining Queues for Static CoS Configurations on Trio MPC/MIC Interfaces
- Managing Dedicated and Remaining Queues for Dynamic CoS Configurations on Trio MPC/MIC Interfaces on page 689

Enabling CoS Shaping-Rate Adjustments for Subscriber Local Loops

You can enhance a CoS implementation by enabling an MX Series Ethernet Services Router to adjust the hierarchical CoS policy shaping rate configured for static interface sets that consist of two or more VLANs and represent subscriber local loops. Whenever the digital subscriber line access multiplexer (DSLAM) resynchronizes its data transmission rate to a digital subscriber line (DSL), the router adjusts the shaping rate for the associated subscriber interface so that the maximum bandwidth allocation cannot exceed the current data rate for the associated subscriber local loop. This feature ensures that data

transmission rate adjustments by the DSLAM do not cause bandwidth contention at the subscriber's residential gateway.

This topic includes the following tasks:

Configuring Static Logical Interface Sets to Serve as CoS Hierarchical Scheduler Nodes for Subscriber Loops

To configure a logical interface set, begin by including the **interface-set** statement with the *interface-set-name* option at the **[edit interfaces]** hierarchy level.

An interface set is composed of two or more logical interfaces on the same physical interface. Each logical interface in an interface set corresponds to an individual subscriber service, such as voice, video, or data. To specify either a list of logical unit numbers or the single outer VLAN tag used to identify the logical interfaces that compose the interface set, include statements at the **[edit interfaces interface-set *interface-set-name*]** hierarchy level:

- For an interface set composed of a list of logical interfaces identified by an inner VLAN tag on Ethernet frames (called the customer VLAN, or C-VLAN, tag), you must specify each logical interface by including the **unit** statement with the ***logical-unit-number*** option.

```
[edit]
interfaces {
   interface-set interface-set-name {
      interface ethernet-interface-name { # EQ DPC port
         unit logical-unit-number;
         unit logical-unit-number;
         . . .
      }
      . . .
   }
}
```

- For an interface set composed of a set of VLANs grouped at the DSLAM and identified by the same service VLAN (S-VLAN) tag), you must specify the S-VLAN tag as the outer VLAN tag for each VLAN by including the **vlan-tags-outer** statement with the ***vlan-tag*** option.

```
[edit]
interfaces {
   interface-set interface-set-name {
      interface ethernet-interface-name { # EQ DPC port
         vlan-tags-outer vlan-tag; # Identify the DSLAM
```

```
        }
        ...
      }
    }
```

For more information about configuring CoS hierarchical schedulers, see the *Junos OS Class of Service Configuration Guide*.

Configuring the Logical Interfaces That Compose the Static Logical Interface Sets

Each underlying physical interface must be configured to operate in hierarchical scheduler mode and to support stacked VLAN tagging on all logical interfaces. To configure, include the **hierarchical-scheduler** statement and the **stacked-vlan-tagging** statement at the **[edit interfaces *ethernet-interface-name*]** hierarchy level.

To associate the individual logical interfaces of an interface set with specific subscriber services provided by the subscriber local loop, bind an S-VLAN tag and a C-VLAN tag to each logical interface that belongs to a scheduler node that represents a subscriber local loop. Ethernet frames sent from the logical interfaces contain an outer VLAN tag that identifies a DSLAM and an inner VLAN tag that identifies a subscriber port on the DSLAM. To configure, include the **vlan-tags** statement at each logical interface:

```
[edit]
interfaces {
  ethernet-interface-name { # EQ DPC port underlying an interface set
    hierarchical-scheduler;
    stacked-vlan-tagging; # Support 802.1Q VLAN dual-tagged frames
    unit logical-unit-number { # Bind S-VLAN and C-VLAN tags to logical interface
      vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
    }
    ...
  }
}
```

For more information about configuring 802.1Q VLANs, see the *Junos OS Network Interfaces Configuration Guide*.

Configuring Hierarchical CoS on the Static Logical Interface Sets That Serve as Hierarchical Scheduler Nodes for Subscriber Local Loops

To configure hierarchical CoS on the static logical interface set that serves as the hierarchical scheduler node for a subscriber local loop:

1. For each scheduler node that represents a subscriber local loop, configure an initial shaping rate.

NOTE: The CoS shaping-rate feature is supported only for scheduler nodes with a configured shaping rate. The initial shaping rate must be configured by applying a traffic-control profile that includes the shaping-rate statement. Specify the initial shaping rate as a peak rate, in bits per second (bps), and not as a percentage. Other methods of configuring a shaping rate are not supported with this feature.

- To enable traffic heading downstream (from the router to the DSLAM) to be gathered into an interface set, include the **interface-set** statement and define the logical interface set name as the ***interface-set-name*** option at the **[edit class-of-service interfaces]** hierarchy level.
- To apply output traffic scheduling and shaping parameters at the logical interface set level (rather than at the logical unit level), include the **output-traffic-control-profile** statement and specify the name of a traffic-control profile as the ***profile-name*** option at the **[edit class-of-service interfaces interface-set *interface-set-name*]** hierarchy level.

To configure, include the following statements:

```
interfaces { # Configure interface-specific CoS for incoming packets
  interface-set interface-set-name { # Configure a hierarchical scheduler
    output-traffic-control-profile tc-profile-name; # Level 3 scheduler node
  }
  ...
}
traffic-control-profiles { # Define traffic-control profiles
  tc-profile-name { # Specify a scheduler map and traffic-shaping parameters
    scheduler-map map-name;
    shaping-rate rate; # This is the “configured shaping rate”
    guaranteed-rate (percent percentage | rate);
    delay-buffer-rate (percent percentage | rate);
  }
  ...
}
```

You can include the statements at the following hierarchy levels:

- **[edit class-of-service]**
- **[edit dynamic-profiles *profile-name* class-of-service]**

2. Configure the scheduler maps referenced in the traffic-control profiles applied to the interface sets, the schedulers referenced in those scheduler maps, and the drop profiles referenced in those schedulers.
   - A scheduler map establishes the traffic output queues (forwarding classes) for a scheduler node and associates each queue with a specific scheduler map.
   - A scheduler defines queue properties (transmit rate, buffer size, priority, and drop profile) that specify how traffic is treated in the output queue.
   - A drop profile specifies how aggressively the MX Series router drops packets that are managed by a particular scheduler by defining either a segmented or interpolated graph that maps output queue fullness to packet drop probability.

   To configure, include the statements at the static **[edit class-of-service]** hierarchy level:

```
[edit]
class-of-service {
  scheduler-maps { # Assign queuing characteristics to output queues
```

```
    map-name { # Map output queues to
      forwarding-class class-name scheduler scheduler-name;
      forwarding-class class-name scheduler scheduler-name;
      ...
    }
    ...
  }
  schedulers { # Define queuing characteristics
    scheduler-name { # Specify queuing and buffer management
      transmit-rate transmit-rate-option;
      buffer-size buffer-size-option;
      priority priority-level;
      drop-profile-map loss-priority loss-priority-option protocol any drop-profile
        drop-profile-name;
      . . .
    }
  }
  drop-profiles { # Define random early detection (RED) for the delay buffer
    drop-profile–name { # Specify how to drop packets from an output queue
      drop-profile-name ( # Map a queue fullness to a drop probability
        fill-level percentage drop-probability percentage; # Option 1: segmented
        fill-level percentage drop-probability percentage;
        . . .
      }
        interpolate { # Option 2: interpolated
          drop-probability [ values ];
          fill-level [ values ];
        }
      }
    . . .
    }
  }
```

For more information about configuring scheduler maps, schedulers, and drop profiles, see the *Junos OS Class of Service Configuration Guide*.

Configuring ANCP Functionality That Supports and Drives Shaping-Rate Adjustments for Subscriber Local Loops

To configure the Access Node Control Protocol (ANCP) functionality that supports and drives the shaping-rate adjustments for subscriber local loops:

- Enable ANCP to monitor subscriber local loop rates at the DSLAMs and communicate this information to CoS.
- Configure each DSLAM as an ANCP neighbor of the router so that TCP connections can be established between the router and each DSLAM.
- Identify the subscriber interface sets whose traffic is monitored and shaped by ANCP, and associate those interface sets with the corresponding identifiers configured on the access node (DSLAM) to uniquely identify the subscriber local loops within the access network.

  ANCP uses this information to build a mapping of subscribers to subscriber interfaces. When ANCP receives port management messages from a DSLAM or other access

node, it uses the access identifier contained in the message to determine which hierarchical scheduler node corresponds to the subscriber.

To configure, include statements at the **[edit protocols ancp]** hierarchy level:

```
[edit]
protocols {
  ancp {
    qos-adjust; # Enable ANCP to monitor and adjust CoS shaping rates
    neighbor ip-address; # Configure each DSLAM as an ANCP neighbor
    ...
    interfaces { # Identify subscribers for which ANCP can adjust shaping rates
      interface-set {
        interface-set-name {
          access-identifier identifier-string; # DSLAM ID for the local loop
        }
      }
      ...
    }
    ...
  }
  ...
}
```

Related Documentation

- For hardware requirements and configuration guidelines, see Guidelines for Configuring CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 684
- CoS Shaping-Rate Adjustments for Subscriber Local Loops Overview on page 683
- Verifying the Configuration of ANCP for Shaping-Rate Adjustments on page 698
- Verifying the Configuration of Shaping-Rate Adjustments for Subscriber Local Loops on page 697
- Disabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 696
- Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 702

Disabling CoS Shaping-Rate Adjustments for Subscriber Local Loops

To disable hierarchical CoS shaping-rate adjustments for subscriber local loops:

- Disable hierarchical CoS traffic-shaping adjustment by ANCP:

```
[edit protocols ancp]
user@host# delete qos-adjust
```

Traffic-shaping parameters for all subscriber local loops revert to their current configured values.

Related Documentation

- For hardware requirements and configuration guidelines, see Guidelines for Configuring CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 684
- CoS Shaping-Rate Adjustments for Subscriber Local Loops Overview on page 683

- Enabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 691
- Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 702

Disabling Hierarchical Bandwidth Adjustment for Subscriber Interfaces with Reverse-OIF Mapping

You can disable hierarchical bandwidth adjustment for all subscriber interfaces with reverse OIF mapping enabled on a specified multicast interface. Reverse OIF mapping is used to determine the subscriber VLAN interface and the multicast traffic bandwidth on the interface.

To disable hierarchical bandwidth adjustment:

1. Specify that you want to access the subscriber interfaces with reverse-OIF mapping enabled.

   [edit routing-instances *routing-instance* routing-options multicast interface *interface-name*]
   user@host# edit reverse-oif-mapping

2. Disable hierarchical bandwidth adjustment for all subscriber interfaces on the interface.

   user@host# set no-qos-adjust

Related Documentation

- For hardware requirements and configuration guidelines, see Guidelines for Configuring CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 684
- Hierarchical CoS Shaping-Rate Adjustments Overview on page 682
- Managing Subscriber Overcommitment

Verifying the Configuration of Shaping-Rate Adjustments for Subscriber Local Loops

Purpose Display the configured shaping rate and the adjusted shaping rate for each logical interface set configured for hierarchical CoS.

NOTE: After shaping-rate adjustments are enabled and the router has performed shaping-rate adjustments on a scheduler node, you can configure a new shaping rate by including the shaping-rate statement in a traffic-control profile and then applying that profile to that scheduler node. However, this new shaping-rate value does not immediately result in shaping traffic at the new rate. The scheduler node continues to be shaped at rate set by ANCP. Only when the ANCP shaping-rate adjustment feature is disabled is the scheduler node shaped at the newly configured shaping-rate.

Action Issue the **show class-of-service interface-set** operational command.

Related Documentation

- Enabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 691

Verifying the Configuration of ANCP for Shaping-Rate Adjustments

Purpose Use to display or clear information about the ANCP configuration for shaping-rate adjustments.

Action

- To display ANCP neighbor information, issue the **show ancp neighbor** operational command.
- To clear ANCP neighbors, issue the **clear ancp neighbor** operational command.
- To display ANCP subscriber information, issue the **show ancp subscriber** operational command.
- To display ANCP class-of-service information, issue the **show ancp cos** operational command.

If ANCP is not yet enabled, the process starts when you commit a configuration that contains the **protocols ancp** stanza.

Related Documentation

- ANCP Topology Discovery and Traffic Monitoring Overview on page 709
- Configuring ANCP on page 713

CHAPTER 69

Bandwidth Management for Dynamic CoS Examples

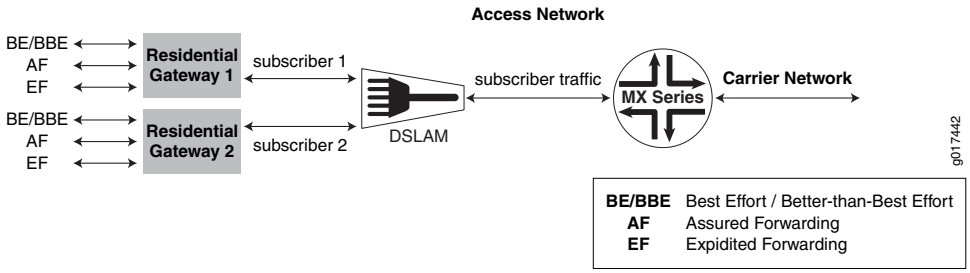
Example: Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates

This topic describes two scenarios for which you can configure dynamic shaping parameters to account for packet overhead in a downstream network.

The RADIUS administrator supplies the initial values on the RADIUS server, and the service activation is performed at subscriber login.

Figure 14 on page 699 shows the sample network that the examples reference.

Figure 14: Sample Network Topology for Downstream Traffic



Managing Traffic with Different Encapsulations

In this example, the MX Series router shown in Figure 14 on page 699 sends stacked VLAN frames to the DSLAM, and the DSLAM sends single-tagged VLAN frames to the residential gateway.

To accurately shape traffic at the residential gateway, the MX Series router must account for the different frame sizes. The difference between the stacked VLAN (S-VLAN) frames sent by the router and the single-tagged VLAN frames received at the residential gateway is a 4-byte VLAN tag. The residential gateway receives frames that are 4 bytes less.

To account for the different frame sizes, the network administrator configures the frame shaping mode with -4 byte adjustment:

1. The network administrator configures the traffic shaping parameters in the dynamic profile and attaches them to the interface.

   Enabling the overhead accounting feature affects the resulting shaping rate, guaranteed rate, and excess rate parameters, if they are configured.

```
[edit]
dynamic-profiles {
  ethernet-downstream-network {
  interfaces {
    $junos-interface-ifd-name {
      unit $junos-underlying-interface-unit {
        family inet;
      }
    }
  }
  class-of-service {
    traffic-control-profiles {
      tcp-example-overhead-accounting-frame-mode {
        excess-rate percent $junos-cos-excess-rate
        guaranteed-rate $junos-cos-guaranteed-rate
        overhead-accounting $junos-cos-shaping-mode bytes $junos-cos-byte-adjust
        shaping-rate $junos-cos-shaping-rate;
      }
    }
    interfaces {
      $junos-interface-ifd-name {
        unit "$junos-underlying-interface-unit" {
        output-traffic-control-profile tcp1;
        }
      }
    }
  }
  }
}
```

   Table 82 on page 700 lists the initial values defined by the RADIUS administrator for the shaping rates.

Table 82: Initial Shaping Values at Subscriber Login

Predefined Variable	RADIUS Tag	Value
$junos-cos-shaping-rate	T02	10m
$junos-cos-guaranteed-rate	T03	2m
$junos-cos-excess-rate	T05	50
$junos-cos-shaping-mode	T07	frame-mode
$junos-cos-byte-adjust	T08	–4

2. The network administrator verifies the adjusted rates.

```
user@host#show class-of-service traffic-control-profile

Traffic control profile: tcp-example-overhead-accounting-frame-mode, Index:
 61785
Excess rate 50
Shaping rate: 10000000
Guaranteed rate: 2000000
Overhead accounting mode: Frame Mode
Overhead bytes: –4
```

Managing Downstream Cell-Based Traffic

In this example, the DSLAM and residential gateway shown in Figure 14 on page 699 are connected through an ATM cell-based network. The MX Series router sends Ethernet frames to the DSLAM, and the DSLAM sends ATM cells to the residential gateway.

To accurately shape traffic at the residential gateway, the MX Series router must account for the different physical network characteristics.

The administrator does not need to configure a byte adjustment value to account for the downstream ATM network, but has the option of configuring a byte adjustment value to account for different encapsulations or decapsulations.

To account for the different frame sizes, the network administrator configures the cell shaping mode:

1. The network administrator configures the traffic shaping parameters in the dynamic profile and attaches them to the interface.

   Enabling the overhead accounting feature affects the resulting shaping rate, guaranteed rate, and excess rate parameters, if they are configured.

```
[edit]
dynamic-profiles {
  atm-downstream-network {
  interfaces {
    $junos-interface-ifd-name {
      unit $junos-underlying-interface-unit {
        family inet;
      }
    }
  }
  class-of-service {
    traffic-control-profiles {
      tcp-example-overhead-accounting-cell-mode {
        excess-rate percent $junos-cos-excess-rate
        guaranteed-rate $junos-cos-guaranteed-rate
        overhead-accounting $junos-cos-shaping-mode
        shaping-rate $junos-cos-shaping-rate
      }
    }
    interfaces {
      $junos-interface-ifd-name {
        unit "$junos-underlying-interface-unit" {
```

```
            output-traffic-control-profile tcp1;
            }
          }
        }
      }
      }
    }
```

Table 83 on page 702 lists the initial values defined by the RADIUS administrator for the shaping rates.

Table 83: Initial Shaping Values at Subscriber Login

Predefined Variable	RADIUS Tag	Value
$junos-cos-shaping-rate	T02	10m
$junos-cos-guaranteed-rate	T03	2m
$junos-cos-excess-rate	T05	50
$junos-cos-shaping-mode	T07	cell-mode

2. The network administrator verifies the adjusted rates.

```
user@host#show class-of-service traffic-control-profile

Traffic control profile: tcp-example-overhead-accounting-cell-mode, Index:
 61785
Shaping rate: 10000000
Excess rate 50
Guaranteed rate: 2000000
Overhead accounting Cell Mode
Overhead bytes: 0
```

To account for ATM segmentation, the MX Series router adjusts all of the rates by 48/53 to account for ATM AAL5 encapsulation. In addition, the router accounts for cell padding, and internally adjusts each frame by 8 bytes to account for the ATM trailer.

Related Documentation

- Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 688

Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops

This example shows how you can enable shaping-rate adjustments for static logical interface sets that represent subscriber local loops:

1. Configure static logical interface sets to serve as CoS hierarchical scheduler nodes for subscriber local loops.

This example uses a single scheduler node that represents two subscriber local loops. The scheduler node is a static logical interface composed of two logical interfaces. The underlying physical interface is port **0** on a Gigabit Ethernet EQ DPC in slot 4, PIC 0:

```
[edit]
interfaces {
  interface-set ifset-of-logical-interfaces {
    interface ge-4/0/0 {
      unit 1;
      unit 2;
    }
  }
  ge-4/0/0 {
    description “access interface ge-4/0/0”;
    hierarchical-scheduler;
    stacked-vlan-tagging;
    unit 1 {
      description “DSL type ADSL1 = 0x01”;
      proxy-arp;
      vlan-tags outer 1 inner 1; # S-VLAN tag is ’1’ and C-VLAN tag is ’1’
      family inet { # Specify a secondary loopback address
        unnumbered-address lo0.0 preferred-source-address 192.168.7.3;
      }
    }
    unit 2 {
      description “DSL type ADSL1 = 0x01”;
      proxy-arp;
      vlan-tags outer 1 inner 2; # S-VLAN tag is ’1’ and C-VLAN tag is ’2’
      family inet { # Specify a secondary loopback address
        unnumbered-address lo0.0 preferred-source-address 192.168.7.4;
      }
    }
  }
}
```

2. Begin configuring hierarchical CoS on the static logical interface set that serves as the hierarchical scheduler node for the group of subscriber local loops.

```
[edit]
class-of-service {
  interfaces {
    interface-set ifset-of-logical-interfaces {
      output-traffic-control-profile tcp-premium-with-4–queues;
    }
  }
}
```

3. Configure the traffic-control profiles that can be applied to the scheduler node:

```
[edit]
class-of-service {
  traffic-control-profiles {
    tcp-basic-rate { # Specify a scheduler map and traffic controls
      shaping-rate 10m;
    }
    tcp-premium-with-4-queues { # Specify a scheduler map and traffic controls
```

```
        scheduler-map smap-premium-4q;
        shaping-rate 20m;
        guaranteed-rate 10m;
        delay-buffer-rate 5m;
      }
    }
  }
```

In this example, the **tcp-premium-with-4-queues** traffic-control profile is applied to the interface set. The other profile provides a lower shaping rate and no guaranteed rate.

4. Configure the scheduler map **smap-premium-4q** that is referenced in the traffic-control profile for the scheduler node:

```
[edit]
class-of-service {
  scheduler-maps { # Define the queues that comprise each scheduler node
    smap-premium-4q { # Map each queue in the scheduler node to a scheduler
      forwarding-class be scheduler be_sch;
      forwarding-class af scheduler af_sch;
      forwarding-class ef scheduler ef_sch;
      forwarding-class nc scheduler nc_sch;
    }
  }
}
```

5. Configure the four schedulers (referenced in the scheduler map) that define the four output queues for the scheduler node:

```
[edit]
class-of-service {
  schedulers { # Define scheduling characteristics of each queue
    be_sch { # Transmit rate and buffer management parameters
      transmit-rate percent 10;
      buffer-size remainder;
      priority low;
    }
    ef_sch { # Transmit rate and buffer management parameters
      ...
    }
    af_sch { # Transmit rate and buffer management parameters
      ...
    }
    nc_sch { # Transmit rate and buffer management parameters
      ...
    }
  }
}
```

6. Enable ANCP to communicate with the DSLAM to adjust the CoS shaping rate for the scheduler node.

   You must enable the ANCP feature for performing CoS traffic shaping adjustments, configure the DSLAM as an ANCP neighbor, and specify the DSLAM-assigned identifier for the subscriber local loop represented by the scheduler node:

```
[edit]
```

```
protocols {
  ancp {
    qos-adjust; # Enable ANCP to adjust CoS shaping rates
    neighbor 10.2.3.4; # Configure the DSLAM as an ANCP neighbor
    interfaces { # Identify subscribers for which ANCP can adjust shaping rates
      interface-set {
        ifset-of-logical-interfaces {
          access-identifier “dslam port 2/3”; # DSLAM ID for the local loop
        }
      }
    }
  }
}
```

NOTE: If ANCP is not yet enabled, the process starts when you commit a configuration that contains the **protocols ancp** stanza.

7. You can display the configured shaping rate and the adjusted shaping rate for each logical interface set configured for hierarchical CoS, issue the **show class-of-service interface-set** operational command.

Related Documentation

- Hierarchical CoS Shaping-Rate Adjustments Overview on page 682
- CoS Shaping-Rate Adjustments for Subscriber Local Loops Overview on page 683
- Guidelines for Configuring CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 684
- Enabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 691

PART 15

Protocols for Subscriber Access

CHAPTER 70

ANCP Overview

ANCP Topology Discovery and Traffic Monitoring Overview

This topic describes ANCP as a means to monitor and modify subscriber traffic in the access network.

Access Node Control Protocol (ANCP) acts as a control plane between a service-oriented layer 3 edge device and a layer 2 access node. Queuing and scheduling mechanisms for subscriber traffic must avoid congestion within the access network while contending with multiple flows and distinct CoS requirements. These mechanisms require the edge device—a network access server (NAS)—to provide information about the access network and subscriber traffic.

The NAS uses topology discovery to get this information from the access node, typically a DSL access multiplexer (DSLAM). The information includes:

- Topology of the access network
- DSL line state
- Actual upstream and downstream net data rates of a synchronized DSL link
- Maximum attainable upstream and downstream net data rates
- Interleaving delay

The NAS receives the service profile for the subscribers from a RADIUS server. Most of the services are enforced by the NAS itself. The NAS shapes the aggregate egress traffic to subscribers based on the local loop throughput reported by the DSLAM. This traffic shaping optimizes traffic flow while avoiding traffic drops in the access node.

Some service attributes, such as interleaving delay and multicast channel information, are enforced at the access node. ANCP provides the line configuration mechanism that the edge device can use to pass the line configuration on to the access nodes. Typically multiple profiles are provisioned on the access node. The NAS instructs the access node which profile to use for a given subscriber.

Subscribers typically receive some combination of voice, data, and video services. Each service can be provisioned on a VLAN. A subscriber might receive only a single service

over a single VLAN configured on a logical interface. A group of VLANs carrying services to a subscriber is an *interface set*. Subscribers are identified based on the unique access identifier that is configured on the access node through which they receive traffic. You must configure this access identifier to associate it with the logical interface or interface set. When ANCP receives a port management message from an access node, it uses the access identifier contained in the message to determine which logical interface or interface set corresponds to the subscriber.

You can configure a logical interface by specifying the interface name at the **[edit protocols ancp interfaces]** hierarchy level. Include the **access-identifier** statement when you do so to associate the access identifier with the interface. You can configure an interface set by including the **interface-set** statement at the **[edit protocols ancp interfaces]** hierarchy level. Associate the access identifier with the interface set by including the **access-identifier** statement at the **[edit protocols ancp interfaces interface-sets *interface-set-name*]** hierarchy level. Because the access identifier must be unique for a given neighbor, you must also include the **neighbor** statement with the **access-identifier** statement in both cases.

Some access nodes might not be running the current IETF implementation of ANCP. Instead, they run an earlier version. You can enable ANCP to operate in backwards-compatible mode with all neighbors by including the pre-ietf-mode statement at the **[edit protocols ancp]** hierarchy level.

You can control how many discovery table entries are accepted from any neighbor by including the **maximum-discovery-table-entries** statement at the **[edit protocols ancp]** hierarchy level.

When you include the **qos-adjust** statement at the **[edit protocols ancp]** hierarchy level, ANCP updates CoS based on monitoring the subscriber traffic. CoS can adjust the traffic shaping rate that it applies to a particular VLAN or set of VLANs to avoid traffic drops in the access node. ANCP can affect only the shaping rate. When ANCP removes a shaping rate that it previously applied, then the traffic shaping rate reverts to that configured in the CLI. If ANCP remains running but loses a connection to a particular neighbor whose subscriber traffic is adjusted as a result of ANCP, the adjusted rate remains in effect. The rate changes only if ANCP restores the connection and sends fresh updates to CoS, or if you remove the **qos-adjust** statement.

ANCP sends a keepalive message to CoS at specific intervals. If CoS does not receive a keepalive in the expected time, it reverts the shaping rate changes it made in response to ANCP. You can adjust how long CoS waits for a keepalive message by including the **maximum-helper-restart-time** statement at the **[edit protocols ancp]** hierarchy level. The interval between keepalive messages is automatically set to one-third the value of the maximum helper restart time. For example, if you set the maximum helper restart time to 120 seconds, then ANCP sends keepalive messages every 40 seconds. In this example, if CoS does not receive a keepalive message within 120 seconds, then it reverts the ANCP-derived policy changes.

ANCP exchanges adjacency messages with neighbors. If an adjacency message is not received from a neighbor within the expected period, then the neighbor is considered to be down and is disconnected. You can adjust how long ANCP waits for adjacency

messages from all neighbors by including the **adjacency-timer** statement at the **[edit protocols ancp]** hierarchy level. The interval between adjacency messages is automatically set to one-third the value of the adjacency timer.

ANCP can monitor and shape traffic only for access nodes that are configured as ANCP neighbors. Neighbors can establish TCP connections with the NAS. You can configure an access node as an ANCP neighbor by including the **neighbor** statement at the **[edit protocols ancp]** hierarchy level.

You can also configure parameters for a specific neighbor to override global or default configurations by including any of the following statements at the **[edit protocols ancp neighbor *ip-address*]** hierarchy level:

- **adjacency-timer**—Adjust the interval between adjacency messages exchanged with this neighbor.
- **ietf-mode**—Prevent ANCP from operating in a backwards-compatible mode for this neighbor; for neighbors that use the current IETF implementation of ANCP.
- **maximum-discovery-table-entries**—Specify how many discovery table entries are accepted from this neighbor.
- **pre-ietf-mode**—Enable ANCP to operate in a backwards-compatible mode for this neighbor; for neighbors that use the original IETF implementation of ANCP rather than the current implementation.

You can monitor ANCP events and operations by including the **traceoptions** statement at the **[edit protocols ancp]** hierarchy level.

Related Documentation

- Configuring ANCP on page 713
- [edit protocols ancp] Hierarchy Level on page 749

CHAPTER 71

Configuring ANCP

Configuring ANCP

You can configure ANCP to enable a service-oriented Layer 3 edge device to discover information about the topology of a connected access network. ANCP can also provide details about subscriber traffic and enable the adjustment of QoS traffic shaping for subscribers.

To configure ANCP:

1. Specify each ANCP neighboring access node to be monitored and optionally configure neighbor parameters.

   See “Configuring ANCP Neighbors” on page 717.

2. Specify the subscribers reached by a VLAN or a set of VLANs through a particular access node.

   See “Associating an Access Node with Subscribers for ANCP Operations” on page 718.

3. Configure the adjacency timer.

   See “Specifying the Interval Between ANCP Adjacency Messages” on page 718.

4. (Optional) Specify the maximum number of discovery table entries that are accepted.

See “Specifying the Maximum Number of Discovery Table Entries” on page 719

5. Configure ANCP to work with an early IETF draft.

   See “Configuring ANCP for Backward Compatibility” on page 719.

6. Configure the graceful restart timer.

   See “Specifying How Long Processes Wait for ANCP Restart to Complete” on page 720.

7. Configure ANCP to adjust QoS subscriber traffic shaping.

   See “Configuring ANCP to Adjust CoS Traffic Shaping” on page 720.

8. Configure trace options for troubleshooting the configuration.

   See “Tracing ANCP Operations” on page 714.

Tracing ANCP Operations

The Junos OS trace feature tracks ANCP operations and records events in a log file. The error descriptions captured in the log file provide detailed information to help you solve problems.

By default, nothing is traced. When you enable the tracing operation, the default tracing behavior is as follows:

1. Important events are logged in a file called **ancpd** located in the **/var/log** directory. You cannot change the directory (**/var/log**) in which trace files are located.
2. When the file **ancpd** reaches 128 kilobytes (KB), it is renamed **ancpd.0**, then **ancpd.1**, and so on, until there are three trace files. Then the oldest trace file (**ancpd.2**) is overwritten.

   You can optionally configure the maximum file size to be from 10 KB through 1 gigabyte (GB). You can also specify the number of trace files to be from 2 through 1000. (For more information about how log files are created, see the *Junos OS System Log Messages Reference*.)

By default, only the user who configures the tracing operation can access log files. You can optionally configure read-only access for other users.

The ANCP traceoptions operations are described in the following sections:

- Configuring the ANCP Trace Log Filename on page 715
- Configuring the Number and Size of ANCP Log Files on page 715
- Configuring Access to the ANCP Log File on page 715
- Configuring a Regular Expression for ANCP Lines to Be Logged on page 716
- Configuring the ANCP Tracing Flags on page 716

Configuring the ANCP Trace Log Filename

By default, the name of the file that records trace output for ANCP is **ancpd**. You can specify a different name with the **file** option.

To configure the filename for ANCP tracing operations:

- Specify the name of the file used for the trace output.

```
[edit protocols ancp traceoptions]
user@host# set file ancp_1
```

Configuring the Number and Size of ANCP Log Files

By default, when the trace file reaches 128 kilobytes (KB) in size, it is renamed ***filename*.0**, then ***filename*.1**, and so on, until there are three trace files. Then the oldest trace file (***filename*.2**) is overwritten.

You can optionally configure the maximum file size to be from 10 KB through 1 gigabyte (GB). You can also specify the number of trace files to be from 2 through 1000.

For example, you can set the maximum file size to 2 MB, and the maximum number of files to 20. When the file that receives the output of the tracing operation (***filename***) reaches 2 MB, ***filename*** is renamed ***filename*.0**, and a new file called ***filename*** is created. When the new ***filename*** reaches 2 MB, ***filename*.0** is renamed ***filename*.1** and ***filename*** is renamed ***filename*.0**. This process repeats until there are 20 trace files. Then the oldest file (***filename*.19**) is overwritten by the newest file (***filename*.0**).

To configure the number and size of trace files:

- Specify the name, number, and size of the file used for the trace output.

```
[edit protocols ancp traceoptions]
user@host# set file ancp_1 _logfile_1 files 20 size 2097152
```

Configuring Access to the ANCP Log File

By default, only the user who configures the tracing operation can access the log files. You can enable all users to read the log file and you can explicitly set the default behavior of the log file.

To specify that all users can read the log file:

- Configure the log file to be world-readable.

```
[edit protocols ancp traceoptions]
user@host# set file ancp_1 _logfile_1 world-readable
```

To explicitly set the default behavior, only the user who configured tracing can read the log file:

- Configure the log file to be no-world-readable.

```
[edit protocols ancp traceoptions]
user@host# set file ancp_1 _logfile_1 no-world-readable
```

Configuring a Regular Expression for ANCP Lines to Be Logged

By default, the trace operation output includes all lines relevant to the logged events.

You can refine the output by including regular expressions to be matched.

To configure regular expressions to be matched:

- Configure the regular expression.

  [edit protocols ancp traceoptions]
  user@host# **set file ancp_1 _logfile_1 match *regex***

Configuring the ANCP Tracing Flags

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
config	Trace configuration events
cos	Trace class-of-service events
general	Trace general flow.
packet	Trace ANCP packet transmit and receive events
process	Trace process internal events
protocol	Trace protocol operations
restart	Trace process restart flow
routing-socket	Trace routing socket events
session	Trace connection events and sessions
startup	Trace ANCP startup events and flow
subscriber	Trace subscriber events
timer	Trace timer processing

To configure the flags for the events to be logged:

- Configure the flags.

  [edit protocols ancp traceoptions]

```
user@host# set flag restart
```

Configuring ANCP Neighbors

You must configure each neighboring access node that you want ANCP to monitor and potentially shape traffic for. Some neighbor settings override globally configured values.

To configure an ANCP neighbor:

1. Specify the IP address of the neighbor.

   ```
   [edit protocols ancp]
   user@host# set neighbor 10.2.3.4
   ```

2. (Optional) Configure pre-ietf mode when the neighbor does not support the current IETF standard and pre-ietf mode is not configured globally.

   ```
   [edit protocols ancp neighbor 10.2.3.4]
   user@host# set pre-ietf-mode
   ```

3. (Optional) Configure ietf mode when the neighbor supports the current IETF standard and pre-ietf-mode is configured globally.

   ```
   [edit protocols ancp neighbor 10.2.3.4]
   user@host# set ietf-mode
   ```

4. (Optional) Configure the interval in seconds between ANCP adjacency messages exchanged with this neighbor.

   ```
   [edit protocols ancp neighbor 10.2.3.4]
   user@host# set adjacency-timer 20
   ```

5. (Optional) Specify the maximum number of discovery table entries that are accepted from this neighbor.

   ```
   [edit protocols ancp neighbor 10.2.3.4]
   user@host# set maximum-discovery-table-entries 10000
   ```

Related Documentation

- Configuring ANCP on page 713
- Configuring ANCP for Backward Compatibility on page 719
- Specifying the Interval Between ANCP Adjacency Messages on page 718
- Specifying the Maximum Number of Discovery Table Entries on page 719

Associating an Access Node with Subscribers for ANCP Operations

Subscribers are identified by a unique access loop identifier that is associated with a logical interface for a single VLAN or with a named set of VLANs through which traffic is sent to the subscribers. The access identifier must be unique either across the network or for individual ANCP neighbors. When the identifier is unique for a neighbor, you must specify the neighbor's IP address.

To associate the access identifier with subscribers, do one of the following:

- Specify the name for the set of VLANs and the unique access-loop identifier for the access node.

  ```
  [edit protocols ancp interfaces]
  user@host# set interface-set vlan5 access-identifier "dslam port 2/3"
  ```

- Specify the logical interface for a single VLAN and the unique access-loop identifier for the access node.

  ```
  [edit protocols ancp interfaces]
  user@host# set ge-1/0/4.12 vlan1 access-identifier "dslam port-2-10" neighbor 10.12.3.4
  ```

Related Documentation

- Configuring ANCP on page 713
- **interfaces (ANCP) on page 940**

Specifying the Interval Between ANCP Adjacency Messages

You can specify the interval between adjacency messages that are sent to all ANCP adjacency peers (neighbors) or to a specific neighbor.

To configure the interval between ANCP adjacency messages for all neighbors:

- Specify the time in seconds.

  ```
  [edit protocols ancp]
  user@host# set adjacency-timer 20
  ```

To configure the interval between ANCP adjacency messages for a specific neighbor:

- Specify the time in seconds.

  ```
  [edit protocols ancp neighbor 10.2.3.4]
  user@host# set adjacency-timer 20
  ```

Related Documentation

- Configuring ANCP on page 713
- Configuring ANCP Neighbors on page 717

Specifying the Maximum Number of Discovery Table Entries

You can specify the maximum number of discovery table entries accepted from all neighbors or from a particular neighbor.

To configure the maximum number of entries for all neighbors:

- Specify the number of entries.

```
[edit protocols ancp]
user@host# set maximum-discovery-table-entries 5000
```

To configure the maximum number of entries for a specific neighbor:

- Specify the number of entries.

```
[edit protocols ancp neighbor 10.2.3.4]
user@host# set maximum-discovery-table-entries 5000
```

Related Documentation

- Configuring ANCP on page 713
- Configuring ANCP Neighbors on page 717

Configuring ANCP for Backward Compatibility

You can configure ANCP to operate in a mode compatible with the protocol as it was initially proposed to operate. This pre-IETF mode is compatible with Internet draft draft-wadhwa-gsmp-l2control-configuration-00.txt, *GSMP extensions for layer2 control (L2C)*. Setting this backward-compatible mode enables interoperation with devices that are not compatible with the current Internet draft for ANCP, draft-ietf-ancp-protocol-02.txt, *Protocol for Access Node Control Mechanism in Broadband Networks*.

To configure ANCP to operate in a backwards-compatible mode for all neighbors:

- Specify the pre-IETF mode.

```
[edit protocols ancp]
user@host# set pre-ietf-mode
```

To configure ANCP to operate in a backwards-compatible mode for a specific neighbor:

- Specify the pre-IETF mode.

```
[edit protocols ancp neighbor 10.2.3.4]
user@host# set pre-ietf-mode
```

Related Documentation

- Configuring ANCP on page 713
- Configuring ANCP Neighbors on page 717

Specifying How Long Processes Wait for ANCP Restart to Complete

You can specify how long other processes wait for ANCP to restart. ANCP sends a keepalive message to CoS at intervals equal to one-third the value of the maximum helper restart time. For example, when you configure the maximum restart time to 120 seconds, ANCP sends a keepalive message every 40 seconds.

If CoS does not receive a keepalive message within the maximum helper restart time, it considers ANCP to be down and immediately reverts any traffic shaping updates that were implemented as a result of ANCP monitoring to the configured values. Consequently, traffic to the subscribers is not effectively shaped, potentially resulting in traffic drops in the DSLAMs The configured values are maintained until ANCP comes back up and sends fresh traffic shaping updates to CoS.

To configure how long other processes wait for ANCP to restart:

- Specify the time in seconds.

```
[edit protocols ancp]
user@host# set maximum-helper-restart-time 150
```

Related Documentation

- Configuring ANCP on page 713
- Configuring ANCP to Adjust CoS Traffic Shaping on page 720
- **qos-adjust on page 1046**

Configuring ANCP to Adjust CoS Traffic Shaping

You can specify that CoS policy for subscriber VLANs are adjusted based on information received from the access network in ANCP messages. Adding or removing this statement updates CoS shaping rate adjustments accordingly for all the subscribers in the network.

If CoS does not receive a keepalive message within the maximum helper restart time, it considers ANCP to be down and immediately reverts any traffic shaping updates that were implemented as a result of ANCP monitoring to the configured values. The configured values are maintained until ANCP comes back up and sends fresh traffic shaping updates to CoS.

Adjusted traffic shaping values remain in effect for subscribers in the event that ANCP remains running, but loses the connection to a neighbor. In this case, CoS does not revert to the configured values. The ANCP-adjusted values can change only if you remove the **qos-adjust** statement or if ANCP restores the connection to that neighbor and sends fresh shaping updates.

To configure CoS adjustment for subscriber traffic based on ANCP messages:

- Specify CoS adjustment.

```
[edit protocols ancp]
user@host# set qos-adjust
```

Related Documentation

- Configuring ANCP on page 713
- CoS Shaping-Rate Adjustments for Subscriber Local Loops Overview on page 683
- Guidelines for Configuring CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 684
- Enabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 691
- Disabling CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 696
- Specifying How Long Processes Wait for ANCP Restart to Complete on page 720
- **maximum-helper-restart-time on page 968**

Verifying and Monitoring ANCP Neighbors

Purpose View ANCP neighbor information:

Action

- To display summary information about all ANCP neighbors:

  user@host> **show ancp neighbor**

- To display information about a specific ANCP neighbor, add the IP address or MAC address to the command:

  user@host> **show ancp neighbor 10.25.64.21**

  user@host> **show ancp neighbor ba:ad:be:ef:10:10** detail

- To display detailed information, add **detail** to the command:

  user@host> **show ancp neighbor detail**

  user@host> **show ancp neighbor ba:ad:be:ef:10:10 detail** detail

Related Documentation

- For more information, see the *Junos Routing Protocols and Policies Command Reference*.

Verifying and Monitoring ANCP Subscribers

Purpose View ANCP subscriber (local access loop) information:

Action

- To display summary information about all ANCP subscribers:

  user@host> **show ancp subscriber**

- To display information about all ANCP subscribers connected through a particular ANCP neighbor:

  user@host> **show ancp subscriber neighbor 10.25.64.21**

- To display information about an ANCP subscriber specified by the access identifier:

  user@host> **show ancp subscriber “port-2-11”**

- To display detailed information, add **detail** to the command:

  user@host> **show ancp subscriber detail**

user@host> **show ancp subscriber neighbor 10.25.64.21 detail**

Related Documentation

- For more information, see the *Junos Routing Protocols and Policies Command Reference*.

Verifying and Monitoring CoS for ANCP Subscribers

Purpose View ANCP CoS state information:

Action

- To display summary information about the CoS state for all ANCP subscribers:

  user@host> **show ancp cos**

- To display information about the CoS state for an ANCP subscriber specified by the access identifier:

  user@host> **show ancp cos "port-2-11"**

- To display the most recently updated CoS information:

  user@host> **show ancp cos last-update**

- To display the CoS information that is pending (will be used to update the fields):

  user@host> **show ancp cos pending-update**

Related Documentation

- For more information, see the *Junos Routing Protocols and Policies Command Reference*.

CHAPTER 72

Dynamic IGMP Configuration Overview

Dynamic IGMP Configuration Overview

The Internet Group Management Protocol (IGMP) is a host to router signaling protocol for IPv4 used to support IP multicasting. This protocol manages the membership of hosts and routers in multicast groups. IP hosts use IGMP to report their multicast group memberships to any immediately neighboring multicast routers. Multicast routers use IGMP to learn, for each of their attached physical networks, which groups have members.

Subscriber access supports the configuration of IGMP within the **dynamic profiles** hierarchy. By specifying IGMP statements within a dynamic profile, you can dynamically apply IGMP configuration when a subscriber connects to an interface using a particular access technology (DHCP), enabling the subscriber to access a carrier (multicast) network.

Related Documentation

- Dynamic Profiles Overview on page 325
- Configuring a Dynamic Profile for Client Access on page 353
- For general information about configuring IGMP, see the *Junos OS Multicast Protocols Configuration Guide*

CHAPTER 73

Dynamic MLD Configuration Overview

Dynamic MLD Configuration Overview

The Multicast Listener Discovery (MLD) Protocol manages the membership of hosts and routers in multicast groups. IP version 6 (IPv6) multicast routers use MLD to learn, for each of their attached physical networks, which groups have interested listeners. Each router maintains a list of host multicast addresses that have listeners for each subnet, as well as a timer for each address. However, the router does not need to know the address of the listeners—just the address of the hosts. The router provides addresses to the multicast routing protocol it uses; this ensures that multicast packets are delivered to all subnets where there are interested listeners. In this way, MLD is used as the transport for the Protocol Independent Multicast (PIM) protocol.

Subscriber access supports the configuration of MLD within the **dynamic profiles** hierarchy for dynamically-created interfaces. By specifying MLD statements within a dynamic profile, you can dynamically apply MLD configuration when a subscriber connects to an interface using a particular access technology (DHCP), enabling the subscriber to access a carrier (multicast) network.

Related Documentation

- Dynamic Profiles Overview on page 325
- Configuring a Dynamic Profile for Client Access on page 353
- For general information about configuring MLD, see the *Junos OS Multicast Protocols Configuration Guide*

CHAPTER 74

Dynamic Router Advertisement Overview

Dynamic Router Advertisement Configuration Overview

In a network deployment where router interfaces are configured statically, you might need to configure the Router Advertisement Protocol on only a small number of interfaces on which it might run. However, in a subscriber access network, static configuration of the Router Advertisement Protocol becomes impractical because the number of interfaces that potentially need the Router Advertisement Protocol increases substantially. In addition, deploying services in a dynamic environment requires dynamic modifications to interfaces as they are created.

Subscriber access supports the configuration of the Router Advertisement Protocol at the **[edit dynamic-profiles *profile-name* protocols]** hierarchy level. By specifying Router Advertisement Protocol statements within a dynamic profile, you can dynamically apply a Router Advertisement configuration when a subscriber connects to an interface using a particular access technology (for example, DHCP), enabling the subscriber to access a carrier (multicast) network.

To minimally configure the Router Advertisement Protocol requires that you include the **router-advertisement** statement at the **[edit dynamic-profiles *profile-name* protocols]** hierarchy level and the **interface** statement along with the ***$junos-interface-name*** dynamic variable. All other statements are optional.

NOTE: Statements used for Router Advertisement Protocol configuration at the [edit dynamic-profiles *profile-name* protocols] hierarchy level are identical in function to those same statements used for static Router Advertisement Protocol configuration, with the exception of the interface and prefix statements which use dynamic variables.

Related Documentation

- Dynamic Profiles Overview on page 325
- Configuring a Dynamic Profile for Client Access on page 353
- RADIUS Support for Dynamic Router Advertisement
- Configuring an Address-Assignment Pool for Router Advertisement

- For general information about configuring the Router Advertisement Protocol, see the *Junos Routing Protocols Configuration Guide*.

PART 16

Subscriber Access Examples

CHAPTER 75

Service Profile Examples

Example: Configuring a Tiered Service Profile for Subscriber Access

This example shows how to configure a tiered service profile for subscribers.

The profile contains three services:

- Gold—Subscribers that pay for this service are allocated 10M bandwidth for data, voice, and video services.
- Silver—Subscribers that pay for this service are allocated 5M bandwidth for data, voice, and video services.
- Bronze—Subscribers that pay for this service are allocated 1M bandwidth for the data service only.

Each subscriber is allocated a VLAN that is created statically. Subscribers log in using DHCP and authenticate using RADIUS. The subscribers can migrate from one service to another when they change subscriptions.

To configure a profile for a tiered service:

1. Configure the VLAN interfaces associated with each subscriber. Enable hierarchical scheduling for the interface.

```
interfaces {
  ge-2/0/0 {
    description subscribers;
    hierarchical-scheduler;
    stacked-vlan-tagging;
    unit 1 {
      vlan-tags outer 100 inner 100;
      family inet {
        unnumbered-address lo0.0 preferred-source-address 100.0.0.1;
      }
    }
    unit 2 {
      family inet {
        vlan-tags outer 101 inner 101;
        unnumbered-address lo0.0 preferred-source-address 100.0.0.1;
      }
```

```
    }
    unit 3 {
      vlan-tags outer 102 inner 102;
      family inet {
        unnumbered-address lo0.0 preferred-source-address 100.0.0.1;
      }
    }
  }
}
```

2. Configure the static CoS parameters.

   In this example, each offering (video, voice, and data) is assigned a queue, and each service (Gold, Silver, and Bronze) is assigned a scheduler.

```
class-of-service {
  forwarding-classes {
    queue 0 data;
    queue 1 voice;
    queue 3 video;
  }
  scheduler-maps {
    bronze_service_smap {
      forwarding-class data scheduler data_sch;
    }
    silver_service_smap {
      forwarding-class data scheduler data_sch;
      forwarding-class voice scheduler silver_voice_sch;
      forwarding-class video scheduler silver_video_sch;
    }
    gold_service_smap {
      forwarding-class data scheduler data_sch;
      forwarding-class voice scheduler gold_voice_sch;
      forwarding-class video scheduler gold_video_sch;
    }
  }
  schedulers {
    data_sch {
      transmit-rate percent 20;
      buffer-size remainder;
      priority low;
    }
    silver_voice_sch {
      transmit-rate percent 30;
      buffer-size remainder;
      priority high;
    }
    silver_video_sch {
      transmit-rate percent 30;
      buffer-size remainder;
      priority medium;
    }
    gold_voice_sch {
      transmit-rate percent 40;
      buffer-size remainder;
      priority high;
    }
```



```
    gold_video_sch {
      transmit-rate percent 40;
      buffer-size remainder;
      priority medium;
    }
  }
}
```

3. Configure the dynamic profile for the service.

   The scheduler maps configured for each service are referenced in the dynamic profile.

```
dynamic-profiles {
  subscriber_profile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit" {
          family inet;
        }
      }
    }
    class-of-service {
      traffic-control-profiles {
        subscriber_tcp {
          scheduler-map $smap;
          shaping-rate $shaping-rate;
          guaranteed-rate $guaranteed-rate;
          delay-buffer-rate $delay-buffer-rate;
        }
      }
      interfaces {
        "$junos-interface-ifd-name" {
          unit "$junos-underlying-interface-unit" {
            output-traffic-control-profile subscriber_tcp;
          }
        }
      }
    }
```

4. Configure access for the subscribers.

   The DHCP relay agent forwards DHCP request and reply packets between a DHCP client and a DHCP server. You use DHCP relay to obtain configuration parameters, including an IP address, for subscribers. In this example, one DHCP server, address 100.20.42.1, can be used by subscribers.

   The DHCP relay configuration is attached to an active server group named service_provider_group.

   The subscribers are grouped together within the subscriber_group, and identifies characteristics such as authentication, username info, and the associated interfaces for the group members. In this example, it also identifies the active server group and the dynamic interface that is used by the subscribers in the group.

```
forwarding-options {
  dhcp-relay {
    server-group {
```

```
        service_provider_group {
            100.20.42.1;
        }
    }
    group subscriber_group {
        active-server-group service_provider_group;
        dynamic-profile subscriber_profile;
        interface ge-2/0/0.1;
        interface ge-2/0/0.2;
        interface ge-2/0/0.3;
    }
  }
}
```

Related Documentation

- For more information about configuring CoS for subscriber access, see CoS for Subscriber Access Overview on page 591

PART 17

Complete Configuration Statement Hierarchy and Summary of Statements for Subscriber Access

CHAPTER 76

Subscriber Access Statement Hierarchy

[edit access address-assignment] Hierarchy Level

```
access {
  address-assignment {
    neighbor-discovery-router-advertisement ndra-pool-name;
    pool pool-name {
      family family {
        dhcp-attributes {
          [protocol-specific attributes]
        }
        host hostname {
          hardware-address mac-address;
          ip-address ip-address;
        }
        network address-or-prefix</subnet-mask>;
```

```
            prefix ipv6-prefix;
            range range-name {
              high upper-limit;
              low lower-limit;
              prefix-length prefix-length;
            }
          }
        }
      }
      link pool-name;
    }
```

Related Documentation

- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56

[edit access domain] Hierarchy Level

```
access {
  domain {
    delimiter [delimiter-character];
    map domain-map-name {
      aaa-logical-system logical-system-name {
        aaa-routing-instance routing-instance-name;
      }
      aaa-routing-instance routing-instance-name;
      access-profile profile-name;
      address-pool pool-name;
      dynamic-profile profile-name;
      padn destination-address {
        mask destination-mask;
        metric route-metric;
      }
      strip-domain;
      target-logical-system logical-system-name {
        target-routing-instance routing-instance-name;
      }
      target-routing-instance routing-instance-name;
      tunnel-profile profile-name;
    }
  parse-direction (left-to-right | right-to-left);
}
```

Related Documentation

- Domain Mapping Overview on page 65
- Configuring Domain Maps on page 66

[edit access profile] Hierarchy Level

```
access {
  profile profile-name {
    accounting {
      accounting-stop-on-access-deny;
      accounting-stop-on-failure;
```

```
    coa-immediate-update
    order [ accounting-method ];
    statistics (time | volume-time);
    update-interval minutes;
  }
  authentication-order [ authentication-methods ];
  authorization-order jsrc;
  provisioning-order (gx-lite| jsrc);
  radius {
    accounting-server [ ip-address ];
    attributes {
      exclude
        accounting-authentic [ accounting-on | accounting-off ];
        accounting-delay-time [ accounting-on | accounting-off ];
        accounting-session-id [ access-request | accounting-on | accounting-off |
          accounting-stop ];
        accounting-terminate-cause [ accounting-off ];
        called-station-id [ access-request | accounting-start | accounting-stop ];
        calling-station-id [ access-request | accounting-start | accounting-stop ];
        class [ accounting-start | accounting-stop ];
        dhcp-gi-address [ access-request | accounting-start | accounting-stop ];
        dhcp-mac-address [ access-request | accounting-start | accounting-stop ];
        output-filter [ accounting-start | accounting-stop ];
        event-timestamp [ accounting-on | accounting-off | accounting-start |
          accounting-stop ];
        framed-ip-address [ accounting-start | accounting-stop ];
        framed-ip-netmask [ accounting-start | accounting-stop ];
        input-filter [ accounting-start | accounting-stop ];
        input-gigapackets [ accounting-stop ];
        input-gigawords [ accounting-stop ];
        interface-description [ access-request | accounting-start | accounting-stop ];
        nas-identifier [ access-request | accounting-on | accounting-off | accounting-start
          | accounting-stop ];
        nas-port [ access-request | accounting-start | accounting-stop ];
        nas-port-id [ access-request | accounting-start | accounting-stop ];
        nas-port-type [ access-request | accounting-start | accounting-stop ];
        output-gigapackets [ accounting-stop ];
        output-gigawords [ accounting-stop ];
      }
      ignore {
        framed-ip-netmask;
        input-filter;
        logical-system:routing-instance;
        output-filter;
      }
    }
    authentication-server [ ip-address ];
    options {
      accounting-session-id-format (decimal | description);
      client-accounting-algorithm (detail | round-robin);
      client-authentication-algorithm(detail | round-robin);
      ethernet-port-type-virtual;
      interface-description-format {
        exclude-adapter;
        exclude-sub-interface;
      }
```

```
            nas-identifier identifier-value;
            nas-port-extended-format {
              adapter-width width;
              port-width width;
              slot-width width;
              stacked-vlan-width width;
              vlan-width width;
            }
            revert-interval interval;
            vlan-nas-port-stacked-format;
          }
        }
        radius-server server-address {
          accounting-port port-number;
          port port-number;
          retry attempts;
          routing-instance routing-instance-name;
          secret password;
          source-address source-address;
          timeoutseconds;
        }
      }
    }
```

Related Documentation

- AAA Service Framework Overview on page 18

[edit access tunnel-profile] Hierarchy Level

```
access {
  tunnel-profile profile-name {
    tunnel tunnel-id {
      identification name;
      logical-system logical-system-name;
      max-sessions number;
      medium type;
      preference number;
      remote-gateway {
        addressserver-ip-address;
        gateway-name server-name;
      }
      routing-instance routing-instance-name;
      secret password;
      source-gateway {
        address client-ip-address;
        gateway-name client-name;
      }
      type tunnel-type;
    }
  }
}
```

Related Documentation

- Configuring a Tunnel Profile for Subscriber Access on page 219

[edit chassis] Hierarchy Level

```
chassis {
  ...
  ppp-subscriber-services (disable | enable);
  ...
}
```

Related Documentation

- Configuring PPP Subscriber Services for MLPPP Bundles on page 206

[edit diameter] Hierarchy Level

```
diameter {
  network-element element-name {
    forwarding {
      route dne-route-name {
        destination realm realm-name <host hostname>;
        function function-name <partition partition-name>;
        metric route-metric;
      }
    }
    function function-name;
    peer peer-name {
      priority priority-number;
    }
  }
  origin {
    host hostname;
    realm realm-name;
  }
  peer peer-name {
    address ip-address;
    connect-actively {
      port port-number;
    }
    logical-system logical-system-name <routing-instance routing-instance-name >;
    routing-instance routing-instance-name;
  }
}
```

Related Documentation

- Diameter Base Protocol Overview on page 231
- Configuring Diameter on page 233

[edit dynamic-profiles] Hierarchy Level

```
dynamic-profiles {
  profile-name {
    class-of-service {
      interfaces {
        interface-name {
          unit logical-unit-number {
```

```
            classifiers {
              type (classifier-name | default);
            }
            output-traffic-control-profile profile-name;
            rewrite-rules {
              dscp (rewrite-name | default);
              dscp-ipv6 (rewrite-name | default);
              ieee-802.1 (rewrite-name | default) vlan-tag (outer | outer-and-inner);
              inet-precedence (rewrite-name | default);
              }
            }
          }
        }
      }
      scheduler-maps {
        map-name {
          forwarding-class class-name scheduler scheduler-name;
        }
      }
      schedulers {
        (scheduler-name) {
          buffer-size (percent percentage | remainder | temporal microseconds |
            $junos-cos-scheduler-bs);
          drop-profile-map loss-priority (any | low | medium-low | medium-high | high)
            protocol (any | non-tcp | tcp) drop-profile (profile-name | predefined-variable);
          excess-priority (low | high | $junos-cos-scheduler-excess-priority);
          excess-rate (percent percentage  | percent $junos-cos-scheduler-excess-rate);
          overhead-accounting (shaping-mode) <bytes (byte-value>;
          priority (priority-level | $junos-cos-scheduler-priority);
          shaping-rate (rate | predefined-variable);
          transmit-rate (rate | percent percentage | remainder | percent percentage
            $junos-cos-scheduler-tx) <exact | rate-limit>;
        }
      }
      traffic-control-profiles profile-name {
        delay-buffer-rate (percent percentage | rate);
        excess-rate (percent percentage | proportion value | percent
          $junos-cos-excess-rate);
        guaranteed-rate (percent percentage | rate);
        overhead-accounting (shaping-mode) <bytes (byte-value>;
        scheduler-map map-name;
        shaping-rate (percent percentage | rate | predefined-variable);
      }
    }
    firewall {
      family family {
        fast-update-filter filter-name {
          interface-specific;
          match-order [match-order];
          term term-name {
            from {
              match-conditions;
            }
            then {
              action;
              action-modifiers;
```

```
            }
            only-at-create;
          }
        }
      }
    }
    interfaces {
      interface-name {
        unit logical-unit-number {
          family family {
            address address;
            filter {
              adf {
                counter;
                input-precedence precedence;
                output-precedence precedence;
                rule rule-value;
              }
              input filter-name {
                precedence precedence;
              }
              output filter-name {
                precedence precedence;
              }
            }
            service {
              input {
                service-set service-set-name {
                  service-filter filter-name;
                }
                post-service-filter filter-name;
              }
              output {
                service-set service-set-name {
                  service-filter filter-name;
                }
              }
            }
            unnumbered-address interface-name preferred-source-address address;
          }
          ppp-options {
            chap;
            pap;
          }
          vlan-id number;
        }
        vlan-tagging;
      }
      interface-set interface-set-name {
        interface interface-name {
          unit logical-unit-number;
        }
      }
      demux0 {
        unit logical-unit-number {
          demux-options {
```

```
        underlying-interface interface-name
      }
      demux-source {
        source-prefix;
      }
      family family {
        address address;
        filter {
          input filter-name;
          output filter-name;
        }
        mac-validate (loose | strict):
        unnumbered-address interface-name preferred-source-address address;
      }
    }
  }
  pp0 {
    unit logical-unit-number {
      keepalives interval seconds;
      no-keepalives;
      pppoe-options {
        underlying-interface interface-name;
        server;
      }
      ppp-options {
        chap;
        pap;
      }
      family inet {
        unnumbered-address interface-name destination address destination-profile
          profile-name;
        address address;
        service {
          input {
            service-set service-set-name {
              service-filter filter-name;
            }
            post-service-filter filter-name;
          }
          output {
            service-set service-set-name {
              service-filter filter-name;
            }
          }
        }
        filter {
          input filter-name {
            precedence precedence;
          }
          output filter-name {
            precedence precedence;
          }
        }
      }
    }
  }
```

```
}
protocols {
   igmp {
      interface interface-name {
         accounting;
         disable;
         group-policy;
         immediate-leave
         no-accounting;
         promiscuous-mode;
         ssm-map ssm-map-name;
         static {
            group group {
               source source;
            }
         }
         version version;
      }
      mld {
         interfaceinterface-name {
            disable;
            (accounting | no-accounting);
            group-policy;
            immediate-leave;
            oif-map;
            passive;
            ssm-map ssm-map-name;
            static {
               group multicast-group-address {
                  exclude;
                  group-count number;
                  group-increment increment;
                  source ip-address {
                     source-count number;
                     source-increment increment;
                  }
               }
            }
            version version;
         }
      }
      router-advertisement {
         interfaceinterface-name {
            current-hop-limitnumber;
            default-lifetime seconds;
            (managed-configuration | no-managed-configuration);
            max-advertisement-interval seconds;
            min-advertisement-interval seconds;
            (other-stateful-configuration | no-other-stateful-configuration);
            prefixprefix {
               (autonomous | no-autonomous);
               (on-link | no-on-link);
               preferred-lifetime seconds;
               valid-lifetime seconds;
            }
            reachable-time milliseconds;
```

```
                retransmit-timer milliseconds;
              }
            }
          }
        }
      }
      routing-instances {
        interface interface-name;
      }
      routing-options {
        access {
          route prefix {
            next-hop next-hop;
            metric route-cost;
            preference route-distance;
          }
        }
        access-internal {
          route subscriber-ip-address {
            qualified-next-hop underlying-interface {
              mac-address address;
            }
          }
        }
        multicast {
          interface interface-name {
            no-qos-adjust;
          }
        }
      }
    }
```

Related Documentation

- Dynamic Profiles Overview on page 325
- CoS for Subscriber Access Overview on page 591
- Configuring a Basic Dynamic Profile on page 349
- Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 601

[edit forwarding-options dhcp-relay] Hierarchy Level

```
forwarding-options {
  dhcp-relay {
    authentication {
      password password-string;
      username-include {
        circuit-type;
        delimiter delimiter-character;
        domain-name domain-name-string;
        logical-system-name;
        mac-address;
        option-60;
        option-82 [circuit-id] [remote-id];
```

```
      routing-instance-name;
      user-prefix user-prefix-string;
    }
  }
  duplicate-clients-on-interface;
  dynamic-profile profile-name (aggregate-clients (merge | replace) | use-primary
    primary-profile-name);
  forward-snooped-clients (all-interfaces | configured-interfaces |
    non-configured-interfaces);
  interface-traceoptions {
    file <filename> <files number> <match regular-expression > <size size>
      <world-readable | no-world-readable>;
    flag flag;
    no-remote-trace;
  }
  overrides {
    allow-snooped-clients;
    always-write-giaddr;
    always-write-option-82;
    client-discover-match <option60-and-option82>;
    interface-client-limit number;
    layer2-unicast-replies;
    no-allow-snooped-clients;
    no-arp;
    no-bind-on-request;
    proxy-mode;
    replace-ip-source-with;
    send-release-on-delete;
    trust-option-82;
    disable-relay;
  }
  relay-option-60 {
    vendor-option {
      (equals | starts-with) (ascii match-string | hexadecimal match-hex) {
        (default-relay-server-group server-group-name |
        default-local-server-group local-server-group-name |
        drop);
      }
      (default-relay-server-group server-group-name |
      default-local-server-group local-server-group-name |
      drop);
    }
  }
  relay-option-82 {
    circuit-id {
      prefix prefix;
      use-interface-description (logical | device);
    }
  }
  server-group {
    server-group-name {
      server-ip-address;
    }
  }
  active-server-group server-group-name;
  group group-name {
```

```
active-server-group server-group-name;
authentication {
  password password-string;
  username-include {
    circuit-type;
    delimiter delimiter-character;
    domain-name domain-name-string;
    logical-system-name;
    mac-address;
    option-60;
    option-82 [circuit-id] [remote-id];
    overrides {
      allow-snooped-clients;
      always-write-giaddr;
      always-write-option-82;
      client-discover-match <option60-and-option82>;
      disable-relay;
      interface-client-limit number;
      layer2-unicast-replies;
      no-allow-snooped-clients;
      no-arp;
      no-bind-on-request;
      proxy-mode;
      replace-ip-source-with;
      send-release-on-delete;
      trust-option-82;
    }
    routing-instance-name;
    user-prefix user-prefix-string;
  }
}
dynamic-profile profile-name (aggregate-clients (merge | replace) | use-primary
  primary-profile-name);
relay-option-60 {
  vendor-option {
    (equals | starts-with) (ascii match-string | hexadecimal match-hex) {
      (default-relay-server-group server-group-name |
      default-local-server-group local-server-group-name |
      drop);
    }
    (default-relay-server-group server-group-name |
    default-local-server-group local-server-group-name |
    drop);
  }
}
relay-option-82 {
  circuit-id {
    prefix prefix;
    use-interface-description (logical | device);
  }
}
interface interface-name {
  exclude;
  overrides {
    allow-snooped-clients;
    always-write-giaddr;
```

```
            always-write-option-82;
            client-discover-match <option60-and-option82>;
            disable-relay;
            interface-client-limit number;
            layer2-unicast-replies;
            no-allow-snooped-clients;
            no-arp;
            proxy-mode;
            replace-ip-source-with;
            send-release-on-delete;
            trust-option-82;
          }
          trace;
          upto upto-interface-name;
        }
      }
      traceoptions {
        file filename <files number> <size size> <world-readable | no-world-readable>
          <match regex>;
        flag flag;
      }
    }
  }
```

Related Documentation

- Extended DHCP Relay Agent Overview on page 136

[edit jsrc] Hierarchy Level

```
jsrc {
  partition partition-name {
    diameter-instance instance-name;
    destination-host hostname;
    destination-realm realm-name;
  }
}
```

Related Documentation

- Juniper Networks Session and Resource Control (SRC) and JSRC Overview on page 243
- Configuring JSRC on page 251

[edit protocols ancp] Hierarchy Level

```
protocols {
  ancp {
    adjacency-timer;
    interfaces {
      interface-set interface-set-name {
        access-identifier identifier-string <neighbor ip-address>;
      }
      interface-name {
        access-identifier identifier-string <neighbor ip-address>;
      }
    }
```

```
        maximum-discovery-table-entries entry-number;
        maximum-helper-restart-time;
        neighbor ip-address {
          adjacency-timer;
          ietf-mode;
          maximum-discovery-table-entries entry-number;
          pre-ietf-mode;
        }
        pre-ietf-mode;
        qos-adjust;
        traceoptions {
          file <filename> <files number> <match regular-expression > <size maximum-file-size>
            <world-readable | no-world-readable>;
          flag flag;
          level (all | error | info | notice | verbose | warning);
          no-remote-trace;
        }
      }
    }
```

Related Documentation

- ANCP Topology Discovery and Traffic Monitoring Overview on page 709
- Configuring ANCP on page 713

[edit services captive-portal-content-delivery] Hierarchy Level

```
services {
  captive-portal-content-delivery {
    rule rule-name {
      match-direction (input | output | input-output);
      term term-name {
        from {
          application [junos-http, junos-https, junos-httpproxy];
          destination-address address destination-address-except;
          destination-prefix-list list-name destination-prefix-list-except;
        }
        then {
          action;
          action-modifiers;
        }
      }
    }
    rule-set rule-set-name{
      [ rule rule-names];
    }
  }
}
```

Related Documentation

- Notational Conventions Used in Junos Configuration Hierarchies
- [edit services] Hierarchy Level

[edit services l2tp] Hierarchy Level

NOTE: The tunnel-group *group-name* is not supported for LAC on MX Series routers. It applies only to LNS on M Series routers. Similarly, some of the options for the traceoptions statement apply only to LNS on M Series routers; for more information, see traceoptions.

```
services {
  l2tp {
    disable-calling-number-avp;
    fail-over-within-preference;
    tunnel-group group-name {
      hello-interval seconds;
      hide-avps;
      l2tp-access-profile profile-name;
      local-gateway address address;
      maximum-send-window packets;
      ppp-access-profile profile-name;
      receive-window packets;
      retransmit-interval seconds;
      service-interface interface-name;
      syslog {
        host hostname {
          facility-override facility-name;
          log-prefix prefix-number;
          services severity-level;
        }
      }
      tunnel-timeout seconds;
    }
    traceoptions {
      debug-level level;
      file <filename> <files number> <match regular-expression > <size maximum-file-size>
        <world-readable | no-world-readable>;
      filter {
        protocol name;
        user-name username;
      }
      flag flag;
      interfaces interface-name {
        debug-level severity;
        flag flag;
      }
      level (all | error | info | notice | verbose | warning);
      no-remote-trace;
    }
    weighted-load-balancing;
  }
}
```

Related Documentation

- L2TP for Subscriber Access Overview on page 211

- Configuring an L2TP LAC on page 219

[edit services mobile-ip] Hierarchy Level

```
services {
  mobile-ip {
    access-type {
      (generic | wimax);
    }
    authenticate {
      order (aaa | local);
    }
    dynamic-home-assignment {
      home-agent {
        nai (name@domain | @domain) {
          home-agent ip-address;
        }
      }
    }
    home-agent {
      enable-service interface-name;
      virtual-network {
        home-agent-address ip-address {
          registration-lifetime seconds;
          revocation-required;
          timestamp-tolerance seconds;
        }
      }
    }
    peer {
      (ip-address address | nai name@domain) {
        spi hexadecimal-value {
          algorithm (hmac-md5 | md5);
          entity-type (host | mobility-agent);
          key (hex | ascii) string;
          replay-method (none | timestamp seconds);
        }
      }
    }
    traceoptions {
      file filename <files number> <match regular-expression > <size maximum-file-size>
        <world-readable | no-world-readable>;
      flag flag;
      level <all | error | info | notice | verbose | warning>;
      no-remote-trace;
    }
  }
}
```

Related Documentation

- Mobile IP Home Agent Elements and Behavior on page 303
- Configuring Mobile IP on page 315

[edit services radius-flow-tap] Hierarchy Level

```
services {
  radius-flow-tap {
    forwarding-class class-name;
    interfaces interface-name;
    source-ipv4-address ipv4-address;
  )
}
```

Related Documentation

- Subscriber Secure Policy Overview on page 557
- Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 567

[edit system services dhcp-local-server] Hierarchy Level

```
system {
  services {
    dhcp-local-server {
      authentication {
        password password-string;
        username-include {
          circuit-type;
          delimiter delimiter-character;
          domain-name domain-name-string;
          logical-system-name;
          mac-address;
          option-60;
          option-82 <circuit-id> <remote-id>;
          routing-instance-name;
          user-prefix user-prefix-string;
        }
      }
      dhcpv6 {
        authentication {
          password password-string;
          username-include {
            circuit-type;
            client-id;
            delimiter delimiter-character;
            domain-name domain-name-string;
            logical-system-name;
            relay-agent-interface-id;
            relay-agent-remote-id;
            relay-agent-subscriber-id;
            routing-instance-name;
            user-prefix user-prefix-string;
          }
        }
        group group-name {
          authentication {
            password password-string;
            username-include {
```

```
            circuit-type;
            client-id;
            delimiter delimiter-character;
            domain-name domain-name-string;
            logical-system-name;
            relay-agent-interface-id;
            relay-agent-remote-id;
            relay-agent-subscriber-id;
            routing-instance-name;
            user-prefix user-prefix-string;
          }
        }
        interface interface-name {
          exclude;
          overrides {
            interface-client-limit number;
          }
          trace;
          upto upto-interface-name;
        }
        overrides {
          interface-client-limit number;
          }
        }
        reconfigure {
          attempts attempt-count;
          clear-on-abort;
          strict;
          timeout timeout-value;
          token token-value;
          trigger {
            radius-disconnect;
          }
        }
      }
      overrides {
        interface-client-limit number;
      }
      reconfigure {
        attempts attempt-count;
        clear-on-abort;
        strict;
        timeout timeout-value;
        token token-value;
        trigger {
          radius-disconnect;
        }
      }
    }
    duplicate-clients-on-interface;
    dynamic-profile profile-name (aggregate-clients (merge | replace) | use-primary
      primary-profile-name);
    forward-snooped-clients (all-interfaces | configured-interfaces |
      non-configured-interfaces);
    group group-name {
      authentication {
```

```
    password password-string;
      username-include {
        circuit-type;
        delimiter delimiter-character;
        domain-name domain-name-string;
        logical-system-name;
        mac-address;
        option-60;
        option-82 <circuit-id> <remote-id>;
        overrides;
        routing-instance-name;
        user-prefix user-prefix-string;
        }
      }
      dynamic-profile profile-name (aggregate-clients (merge | replace) | use-primary
        primary-profile-name);
      interface interface-name {
        exclude;
        overrides {
          client-discover-match <option60-and-option82>;
          interface-client-limit number;
          no-arp;
        }
        trace;
        upto upto-interface-name;
      }
      overrides {
        client-discover-match <option60-and-option82>;
        interface-client-limit number;
        no-arp;
      }
      reconfigure {
        attempts attempt-count;
        clear-on-abort;
        timeout timeout-value;
        token token-value;
        trigger {
          radius-disconnect;
        }
      }
  }
  interface-traceoptions {
    file <filename> <files number> <match regular-expression > <size size>
      <world-readable | no-world-readable>;
    flag flag;
    no-remote-trace;
  }
  overrides {
    client-discover-match <option60-and-option82>;
    interface-client-limit number;
    no-arp;
  }
  pool-match-order {
    ip-address-first;
    option-82;
  }
```

```
        reconfigure {
          attempts attempt-count;
          clear-on-abort;
          timeout timeout-value;
          token token-value;
          trigger {
            radius-disconnect;
          }
        }
        traceoptions {
          file filename <files number> <size size> <world-readable | no-world-readable>
            <match regex>;
          flag flag;
        }
      }
    }
  }
```

Related Documentation

- Extended DHCP Local Server Overview on page 84

[edit system services packet-triggered-subscribers] Hierarchy Level

```
system {
  services {
    packet-triggered-subscribers {
      partition partition-name {
        destination-host hostname;
        destination-realm realm;
        diameter-instance instance-name;
      }
      traceoptions {
        file <filename> <files number> <match regular-expression>
          <size maximum-file-size> <world-readable | no-world-readable>;
        flag flag;
        no-remote-trace;
      }
    }
  }
}
```

Related Documentation

- Configuring the PTSP Application on page 283

[edit system services static-subscribers] Hierarchy Level

```
system {
  services {
    static-subscribers {
      access-profile profile-name;
      authentication {
        password password-string;
        username-include {
          domain-name domain-name;
          interface;
```

```
            logical-system-name;
            routing-instance-name;
            user-prefix user-prefix-string;
          }
        }
        dynamic-profile profile-name {
          aggregate-clients (merge | replace);
        }
        group group-name {
          access-profile profile-name;
          authentication {
            password password-string;
            username-include {
              domain-name domain-name;
              interface;
              logical-system-name;
              routing-instance-name;
              user-prefix user-prefix-string;
            }
          }
          dynamic-profile profile-name {
            aggregate-clients (merge | replace);
          }
          interface interface-name <exclude> <upto upto-interface-name>;
        }
        traceoptions {
          file filename <files number> <match regular-expression > <size maximum-file-size>
            <world-readable | no-world-readable>;
          flag flag;
          level (all | error | info | notice | verbose | warning);
          no-remote-trace;
        }
      }
    }
  }
```

Related Documentation

- Subscribers on Static Interfaces Overview on page 255
- Configuring Subscribers over Static Interfaces on page 259

CHAPTER 77

Subscriber Access Configuration Statements

aaa-logical-system (Domain Maps)

Syntax

```
aaa-logical-system logical-system-name {
    aaa-routing-instance routing-instance-name;
}
```

Hierarchy Level [edit access domain map *domain-map-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Configure a non-default logical system to provide AAA services for domain map sessions.

Default The default logical system provides AAA services for the session.

Options ***logical-system-name***—Name of the logical system.

The remaining statement is explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Specifying an AAA Logical System/Routing Instance in a Domain Map on page 70

aaa-routing-instance (Domain Maps)

Syntax aaa-routing-instance *routing-instance-name*;

Hierarchy Level [edit access domain **map** *domain-map-name*],
[edit access domain **map** *domain-map-name* **aaa-logical-system** *logical-system-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Configure a non-default routing instance to provide AAA services for domain map sessions.

Default The default routing instance provides AAA services.

Options ***routing-instance-name***—Name of the routing instance.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Specifying an AAA Logical System/Routing Instance in a Domain Map on page 70

access

Syntax
```
access {
  route prefix {
    next-hop next-hop;
    metric route-cost;
    preference route-distance;
    tag route-tag;
  }
```

Hierarchy Level [edit dynamic-profiles **routing-options**]

Release Information Statement introduced in Junos OS Release 9.5.

Description Dynamically configure access routes.

Options The remaining statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring Dynamic Access Routes for Subscriber Management on page 186

access-concentrator

Syntax access-concentrator *name*;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* pppoe-options],
[edit interfaces *interface-name* unit *logical-unit-number* **pppoe-underlying-options**],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* pppoe-options],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* **pppoe-underlying-options**]

Release Information Statement introduced before Junos OS Release 7.4.
Support at **[edit interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]** and **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* pppoe-underlying-options]** hierarchy levels introduced in Junos OS Release 10.1.

Description For J Series Services Routers with Point-to-Point Protocol over Ethernet (PPPoE) interfaces, configure the name of the access concentrator.

For Intelligent Queuing 2 (IQ2) PICs on M120 and M320 routers and Trio MPC/MIC interfaces on MX Series routers, configure an alternative access concentrator name in the AC-NAME tag in a PPPoE control packet for use with a dynamic PPPoE subscriber interface. If you do not configure the access concentrator name, the AC-NAME tag contains the system name.

Options ***name***—Name of the access concentrator.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Identifying the Access Concentrator
- *Junos OS Interfaces and Routing Configuration Guide*
- For information about creating dynamic PPPoE subscriber interfaces, see Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles on page 467

access-identifier

Syntax access-identifier *identifier-string* <neighbor *ip-address*>;

Hierarchy Level [edit protocols **ancp interfaces interface-set**]

Release Information Statement introduced in Junos OS Release 9.4.

Description Associate the specified access node with the set of VLANs that carry traffic to the subscriber using that access node; identify a particular subscriber.

Options ***identifier-string***—Unique identifier string for the access node; also configured on the access node.

ip-address—IP address of the ANCP neighbor.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring ANCP on page 713
- Associating an Access Node with Subscribers for ANCP Operations on page 718

access-internal

Syntax
```
access-internal {
  route subscriber-ip-address {
    qualified-next-hop underlying-interface {
      mac-address address;
    }
  }
```

Hierarchy Level [edit dynamic-profiles **routing-options**]

Release Information Statement introduced in Junos OS Release 9.5.

Description Dynamically configure access-internal routes. Access-internal routes are optional, but are used instead of access routes if the next-hop address is not specified in the Framed-Route Attribute [22].

Options The remaining statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 187
- Configuring Dynamic Access-Internal Routes for PPP Subscriber Management on page 202

access-profile (Domain Maps)

Syntax access-profile *profile-name*;

Hierarchy Level [edit access domain **map** *domain-map-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Access profile that defines the AAA services and options for subscribers associated with the domain map.

Options ***profile-name***—Name of access profile.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Specifying an Access Profile in a Domain Map on page 67

access-profile (Static Subscribers)

Syntax access-profile *profile-name*;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services **static-subscribers**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers **group** *group-name*],
[edit logical-systems *logical-system-name* system services **static-subscribers**],
[edit logical-systems *logical-system-name* system services static-subscribers **group** *group-name*],
[edit routing-instances *routing-instances-name* system services **static-subscribers**],
[edit routing-instances *routing-instances-name* system services static-subscribers **group** *group-name*],
[edit system services **static-subscribers**],
[edit system services static-subscribers **group** *group-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify the access profile that triggers AAA services for all static subscribers on interfaces configured at the **[edit system services static-subscribers interface]** hierarchy level or for the static subscribers in a specific group. The group version of this statement overrides the global configuration.

Options *profile-name*—Name of the static subscriber access profile.

Required Privilege Level
access—To view this statement in the configuration.
access-control—To add this statement to the configuration.

Related Documentation
- Configuring Subscribers over Static Interfaces on page 259
- Specifying the Static Subscriber Global Access Profile on page 263
- Specifying the Static Subscriber Group Access Profile on page 267

access-type

Syntax

```
access-type {
    (generic | wimax);
}
```

Hierarchy Level

[edit services **mobile-ip**],
[edit logical-systems *logical-system-name* services **mobile-ip**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* services **mobile-ip**],
[edit routing-instances *routing-instance-name* services **mobile-ip**]

Release Information

Statement introduced in Junos OS Release 9.5.

Description

Configure the access type for Mobile IP.

The remaining statements are explained separately.

Default

The generic access type is used by default.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Mobile IP on page 315
- Configuring the Access Type for Mobile IP on page 322

accounting (Access Profile)

Syntax

```
accounting {
  accounting-stop-on-access-deny;
  accounting-stop-on-failure;
  coa-immediate-update;
  immediate-update;
  order [ accounting-method ];
  statistics (time | volume-time);
  update-interval minutes;
}
```

Hierarchy Level [edit access profile *profile-name*]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Configure RADIUS accounting parameters and enable RADIUS accounting for an access profile.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
- Configuring Per-Subscriber Session Accounting on page 24

accounting (Dynamic IGMP Interface)

Syntax

```
accounting;
```

Hierarchy Level [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*],

Release Information Statement introduced in Junos OS Release 9.2.

Description Enable the collection of IGMP join and leave event statistics on a per-interface basis.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring a Dynamic Profile for Client Access on page 353
- For information about recording IGMP join and leave events, see “Recording IGMP Join and Leave Events” in the *Junos OS Multicast Protocols Configuration Guide*

accounting (Dynamic MLD Interface)

Syntax (accounting | no-accounting);

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **mld interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Enable or disable the collection of MLD join and leave event statistics for a dynamic interface.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Recording MLD Join and Leave Events

accounting-port

Syntax accounting-port *port-number*;

Hierarchy Level [edit access **radius-server** *server-address*],
[edit access profile *profile-name* **radius-server** *server-address*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure the port number on which to contact the accounting server.

Options ***port-number***—The 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
- Configuring Router or Switch Interaction with RADIUS Servers on page 19
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
- Configuring RADIUS Authentication for L2TP

accounting-server

Syntax accounting-server [*ip-address*];

Hierarchy Level [edit access profile *profile-name* radius]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify a list of the RADIUS accounting servers used for accounting for DHCP, L2TP, and PPP clients.

Options ***ip-address***—The IP version 4 (IPv4) address.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

accounting-session-id-format

Syntax accounting-session-id-format (decimal | description);

Hierarchy Level [edit access profile *profile-name* radius **options**]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Configure the format the router or switch uses to identify the accounting session.

Default **decimal**

Options **decimal**—Use the decimal format.

description—Use the generic format, in the form: **jnpr** *interface-specifier*:*subscriber-session-id*.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring RADIUS Server Options for Subscriber Access on page 29
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

accounting-stop-on-access-deny

Syntax accounting-stop-on-access-deny;

Hierarchy Level [edit access profile *profile-name* accounting]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Configure RADIUS accounting to send an Acct-Stop message when the AAA server refuses a client request for access.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

accounting-stop-on-failure

Syntax accounting-stop-on-failure;

Hierarchy Level [edit access profile *profile-name* accounting]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Configure RADIUS accounting to send an Acct-Stop message when client access fails AAA but the AAA server grants access.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

active-server-group

Syntax active-server-group *server-group-name*;

Hierarchy Level
[edit forwarding-options **dhcp-relay**],
[edit forwarding-options dhcp-relay **group** *group-name*],
[edit logical-systems *logical-system-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **group** *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name*],
[edit routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name*]

Release Information Statement introduced in Junos OS Release 8.3.

Description Apply a DHCP relay agent configuration to the named group of DHCP server addresses.

You can include the **active-server-group** statement at the **[edit forwarding-options dhcp-relay]** hierarchy level as a global DHCP relay agent configuration option, or at the **[edit forwarding-options dhcp-relay group *group-name*]** hierarchy level as a DHCP relay agent configuration option that applies only to a named group of interfaces.

Including the **active-server-group** statement at the **[edit forwarding-options dhcp-relay group *group-name*]** hierarchy level as a group-specific option overrides use of the **active-server-group** statement at the **[edit forwarding-options dhcp-relay]** hierarchy level as a global option.

Options *server-group-name*—Name of the group of DHCP server addresses to which the DHCP relay agent configuration applies.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Extended DHCP Relay Agent Overview on page 136

address

Syntax address (*ip-address* | *ipv6-address*);

Hierarchy Level [edit dynamic-profiles **interfaces** *interface-name* **unit** *logical-unit-number* **family** *family*],
[edit **dynamic-profiles** *profile-name* **interfaces demux0 unit** *logical-unit-number* **family** *family*],
[edit **dynamic-profiles** *profile-name* **interfaces** pp0 **unit** "$junos-interface-unit" **family** *family*],
[edit logical-systems *logical-system-name* interfaces *interface-name* **unit** *logical-unit-number* **family** *family*]

Release Information Statement introduced in Junos OS Release 9.2.
The **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family*]** hierarchy level added in Junos OS Release 10.1.

Description Configure the interface address. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.

Options ***ip-address***—IPv4 address of the interface.

ipv6-address—IPv6 address of the interface. When configuring an IPv6 address on a dynamically-created interface, use the ***$junos-ipv6–address*** dynamic variable.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- "Configuring the Protocol Family," in *Junos OS Network Interfaces Configuration Guide*.
- *Junos OS System Basics Configuration Guide*

address (Diameter Base Protocol)

Syntax address *ip-address*;

Hierarchy Level [edit **diameter peer** *peer-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure the IP address for a Diameter remote peer.

Options ***ip-address***—IP address of remote Diameter peer.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Diameter on page 233
- Configuring Diameter Peers on page 234

address (Tunnel Profile Remote Gateway)

Syntax address *server-ip-address*;

Hierarchy Level [edit access tunnel-profile *profile-name* tunnel *tunnel-id* **remote-gateway**]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the IP address of the remote gateway device at the L2TP tunnel endpoint, the LNS.

Options ***server-ip-address***—IP address of the remote gateway device.
Default: 0.0.0.0.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring a Tunnel Profile for Subscriber Access on page 219

address (Tunnel Profile Source Gateway)

Syntax address *client-ip-address*;

Hierarchy Level [edit access tunnel-profile *profile-name* tunnel *tunnel-id* **source-gateway**]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the IP address of the source gateway device at the local L2TP tunnel endpoint, the LAC. This value overrides the default address for the logical system or routing instance.

Options ***client-ip-address***—IP address of the source gateway device.
Default: 0.0.0.0.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring a Tunnel Profile for Subscriber Access on page 219

address-assignment (Address-Assignment Pools)

Syntax

```
address-assignment {
  neighbor-discovery-router-advertisement ndra-pool-name;
  pool pool-name {
    family family {
      dhcp-attributes {
        protocol-specific attributes;
      }
      host hostname {
        hardware-address mac-address;
        ip-address ip-address;
      }
      network ip-prefix/<prefix-length>;
      prefix ipv6-prefix;
      range range-name {
        high upper-limit;
        low lower-limit;
        prefix-length prefix-length;
      }
    }
    link pool-name;
  }
}
```

Hierarchy Level [edit access]

Release Information Statement introduced in Junos OS Release 9.0.

Description Configure address-assignment pools that can be used by different client applications.

Options ***pool-name***—Name assigned to an address-assignment pool.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56

address-pool (Domain Maps)

Syntax address-pool *pool-name*;

Hierarchy Level [edit access domain **map** *domain-map-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Address pool used to assign addresses to subscribers associated with the domain map.

Options ***pool-name***—Name of address pool.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Specifying an Address Pool in a Domain Map on page 69

adf (Dynamic Firewalls)

Syntax

```
adf {
  counter;
  input-precedence precedence;
  output-precedence precedence;
  rule rule-value;
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* filter]

Release Information Statement introduced in Junos OS Release 10.4.

Description Configure an Ascend-Data-Filter that the dynamic profile applies to a subscriber session.

Options

counter—Enables a counter that increments each time the Ascend-Data-Filter rule is used. Typically used for testing purposes.

precedence—Precedence value that sets the order in which dynamic service filters are applied on the interface. The lower the precedence value, the higher the precedence that is given. The precedence setting is used in conjunction with the precedence settings of all dynamic service filters configured (not only Ascend-Data-Filters) on the same interface to establish the order. For example, the order also includes any configured **input *filter-name* precedence *precedence*** and **output *filter-name* precedence *precedence*** statements.

Range: 0 through 255

Default: 0

rule-value—The Ascend-Data-Filter rule. You can specify either a Junos predefined variable that maps the Ascend-Data-Filter actions to Junos filter functionality or you can manually configure the Ascend-Data-Filter rule. The router supports two predefined variables depending on family type: **$junos-adf-rule-v4** for family **inet** and **$junos-adf-rule-v6** for family **inet6**.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- For general information about configuring firewall filters, see the *Junos OS Policy Framework Configuration Guide*.
- Dynamic Firewall Filters Overview on page 487
- Classic Filters Overview on page 488
- Basic Classic Filter Syntax on page 490

adjacency-timer

Syntax adjacency-timer *seconds*;

Hierarchy Level [edit protocols **ancp**],
[edit protocols **ancp neighbor**]

Release Information Statement introduced in Junos OS Release 9.4.

Description Specify the interval between adjacency messages sent to ANCP adjacency peer (access node) for all peers or a specific peer.

Options ***seconds***—Number of seconds between adjacency messages.

Range: 1 through 25 seconds

Default: 10 seconds

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring ANCP on page 713
- Specifying the Interval Between ANCP Adjacency Messages on page 718
- Configuring ANCP Neighbors on page 717

aggregate-clients (DHCP Local Server)

Syntax aggregate-clients (merge | replace);

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dynamic-profile** *profile-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **dynamic-profile** *profile-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server **dynamic-profile** *profile-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* **dynamic-profile** *profile-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **dynamic-profile** *profile-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **dynamic-profile** *profile-name*],
[edit system services dhcp-local-server **dynamic-profile** *profile-name*]
[edit system services dhcp-local-server group *group-name* **dynamic-profile** *profile-name*]

Release Information Statement introduced in Junos OS Release 9.3.
merge and **replace** options were added in Junos OS Release 9.5.

Description Specify that the router merge (chain) client attributes such as firewall filters and CoS attributes or replace them when multiple client sessions exist on the same underlying VLAN.

Not supported for IP demux subscriber interfaces.

Options **merge**—Aggregate multiple clients attributes for the same subscriber (logical interface)

replace—Replace the entire logical interface whenever a new client logs into the network using the same VLAN logical interface

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109

aggregate-clients (DHCP Relay Agent)

Syntax aggregate-clients (merge | replace);

Hierarchy Level
[edit forwarding-options dhcp-relay **dynamic-profile** *profile-name*],
[edit forwarding-options dhcp-relay **group** *group-name* **dynamic-profile** *profile-name*],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **dynamic-profile** *profile-name*],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **group** *group-name* **dynamic-profile** *profile-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **dynamic-profile** *profile-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name* **dynamic-profile** *profile-name*],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **dynamic-profile** *profile-name*],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name* **dynamic-profile** *profile-name*]

Release Information Statement introduced in Junos OS Release 9.3.
merge and **replace** options were added in Junos OS Release 9.5.

Description Specify that the router merge (chain) client attributes such as firewall filters and CoS attributes or replace them when multiple client sessions exist on the same underlying VLAN.

Not supported for IP demux subscriber interfaces.

Options **merge**—Aggregate multiple client attributes for the same subscriber (logical interface)

replace—Replace the entire logical interface whenever a new client logs into the network using the same VLAN logical interface

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109

aggregate-clients (Static Subscribers)

Syntax aggregate-clients (merge | replace);

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers **dynamic-profile** *profile-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers group *group-name* **dynamic-profile** *profile-name*],
[edit logical-systems *logical-system-name* system services static-subscribers **dynamic-profile** *profile-name*],
[edit logical-systems *logical-system-name* system services static-subscribers group *group-name* **dynamic-profile** *profile-name*],
[edit routing-instances *routing-instances-name* system services static-subscribers **dynamic-profile** *profile-name*],
[edit routing-instances *routing-instances-name* system services static-subscribers group *group-name* **dynamic-profile** *profile-name*],
[edit system services static-subscribers **dynamic-profile** *profile-name*],
[edit system services static-subscribers group *group-name* **dynamic-profile** *profile-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify for all static subscribers or for a group of static subscribers that the router merge (chain) subscriber (client) attributes such as firewall filters and CoS attributes or replace them when multiple subscriber sessions exist on the same underlying VLAN. The group version of this statement overrides the global version.

This statement is not supported for IP demux subscriber interfaces.

Default By default, multiple subscribers cannot be on the same logical interface.

Options **merge**—Aggregate the attributes of multiple subscribers for the logical interface.

replace—Replace the entire logical interface whenever a new client logs in to the network using the same VLAN logical interface.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Subscribers over Static Interfaces on page 259
- Enabling Multiple Subscribers on a VLAN Logical Interface for All Static Subscribers on page 264

algorithm

Syntax algorithm (hmac-md5 | md5);

Hierarchy Level
[edit logical-systems *logical-system-name* services **mobile-ip peer** ip-address *address* **spi** *hexadecimal-value*],
[edit logical-systems *logical-system-name* services **mobile-ip peer** nai *user*@*domain* **spi** *hexadecimal-value*],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip peer** ip-address *address* **spi** *hexadecimal-value*],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip peer** nai *user*@*domain* **spi** *hexadecimal-value*],
[edit routing-instances *routing-instances-name* services **mobile-ip peer** ip-address *address* **spi** *hexadecimal-value*],
[edit routing-instances *routing-instances-name* services **mobile-ip peer** nai *user*@*domain* **spi** *hexadecimal-value*],
[edit services **mobile-ip peer** ip-address *address* **spi** *hexadecimal-value*],
[edit services **mobile-ip peer** nai *user*@*domain* **spi** *hexadecimal-value*]

Release Information Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services mobile-ip peer ip-address *address* spi *hexadecimal-value*]**, **[edit logical-systems *logical-system-name* services mobile-ip peer nai *user*@*domain* spi *hexadecimal-value*]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip peer ip-address *address* spi *hexadecimal-value*]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip peer nai *user*@*domain* spi *hexadecimal-value*]**, **[edit routing-instances *routing-instances-name* services mobile-ip peer ip-address *address* spi *hexadecimal-value*]**, **[edit routing-instances *routing-instances-name* services mobile-ip peer nai *user*@*domain* spi *hexadecimal-value*]** hierarchy levels added in Junos OS Release 9.5.

Description Configure the algorithm used for authenticating Mobile IP messages.

Default HMAC-MD5 is used by default.

Options **hmac-md5**—Specifies algorithm hmac-md5

md5—Specifies algorithm md5

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Mobile IP on page 315
- Configuring the Mobile IP Home Agent on page 319

allow-snooped-clients

Syntax allow-snooped-clients;

Hierarchy Level
[edit forwarding-options dhcp-relay **overrides**],
[edit forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**]
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* interface *interface-name* **overrides**]

Release Information Statement introduced in Junos OS Release 10.2.

Description Explicitly enable DHCP snooping support on the router.

NOTE: In Junos OS Releases 10.0 and earlier, DHCP snooping is *enabled* by default. In releases 10.1 and later, DHCP snooping 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

- Extended DHCP Relay Agent Overview on page 136
- Overriding the Default DHCP Relay Configuration Settings on page 150
- Managing DHCP Snooping Support on page 156

always-write-giaddr

Syntax always-write-giaddr;

Hierarchy Level
[edit forwarding-options dhcp-relay **overrides**],
[edit forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**]
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* interface *interface-name* **overrides**]

Release Information Statement introduced in Junos OS Release 8.3.

Description Overwrite the gateway IP address (giaddr) of every DHCP packet with the giaddr of the DHCP relay agent before forwarding the packet to the DHCP server.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Extended DHCP Relay Agent Overview on page 136

always-write-option-82

Syntax always-write-option-82;

Hierarchy Level
[edit forwarding-options dhcp-relay **overrides**],
[edit forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**]
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* interface *interface-name* **overrides**]

Release Information Statement introduced in Junos OS Release 8.3.

Description Override the DHCP relay agent information option (option 82) in DHCP packets destined for a DHCP server. The use of this option causes the DHCP relay agent to perform one of the following actions, depending on how it is configured:

- If the DHCP relay agent is configured to add option 82 information to DHCP packets, it clears the existing option 82 values from the DHCP packets and inserts the new values before forwarding the packets to the DHCP server.
- If the DHCP relay agent is not configured to add option 82 information to DHCP packets, it clears the existing option 82 values from the packets, but does not add any new values before forwarding the packets to the DHCP server.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Extended DHCP Relay Agent Overview on page 136

ancp

Syntax

```
ancp {
  adjacency-timer;
  interfaces {
    interface-set interface-set-name {
      access-identifier identifier-string <neighbor ip-address>;
    }
    interface-name {
      access-identifier identifier-string <neighbor ip-address>;
    }
  }
  maximum-discovery-table-entries entry-number;
  maximum-helper-restart-time;
  neighbor ip-address {
    adjacency-timer;
    ietf-mode;
    maximum-discovery-table-entries entry-number;
    pre-ietf-mode;
  }
  pre-ietf-mode;
  qos-adjust;
  traceoptions {
    file <filename> <files number> <match regular-expression > <size maximum-file-size>
      <world-readable | no-world-readable>;
    flag flag;
    level (all | error | info | notice | verbose | warning);
    no-remote-trace;
  }
}
```

Hierarchy Level [edit protocols]

Release Information Statement introduced in Junos OS Release 9.4.

Description Configure Junos ANCP features.

The remaining statements are described separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring ANCP on page 713

application

Syntax application *application-name*;

Hierarchy Level [edit services application-identification rule *rule-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Identify the application for inclusion in a rule.

Options ***application-name***—Identifier for the application.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Redirecting HTTP Requests on page 545
- Configuring APPID Rules

attempts (DHCP Local Server)

Syntax attempts *attempt-count*;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **reconfigure**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **reconfigure**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit system services dhcp-local-server **reconfigure**],
[edit system services dhcp-local-server dhcpv6 **reconfigure**],
[edit system services dhcp-local-server group *group-name* **reconfigure**],
[edit system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**]

Release Information Statement introduced in Junos OS Release 10.0.
The **[edit ... dhcpv6 ...]** hierarchies added in Junos OS Release 10.4.

Description Configure how many attempts are made to reconfigure all DHCP clients or only the DHCP clients serviced by the specified group of interfaces before reconfiguration is considered to have failed. A group configuration takes precedence over a DHCP local server configuration.

Options ***attempt-count***—Maximum number of attempts.

Range: 1 through 10

Default: 8

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 117
- Configuring Dynamic Reconfiguration Attempts for DHCP Clients on page 118

attribute

Syntax attribute *attribute-number*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **variables radius vendor-id**]

Release Information Statement introduced in Junos OS Release 9.3.

Description Configure a RADIUS attribute as a variable in a dynamic profile.

Options ***attribute-number***—Number of the RADIUS attribute.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring User-Defined CoS Variables in a Dynamic Service Profile on page 630

attributes

Syntax

```
attributes {
  exclude {
    accounting-authentic [ accounting-on | accounting-off ];
    accounting-delay-time [ accounting-on | accounting-off ];
    accounting-session-id [ access-request | accounting-on | accounting-off | accounting-stop
      ];
    accounting-terminate-cause [ accounting-off ];
    called-station-id [ access-request | accounting-start | accounting-stop ];
    calling-station-id [ access-request | accounting-start | accounting-stop ];
    class [ accounting-start | accounting-stop ];
    dhcp-gi-address [ access-request | accounting-start | accounting-stop ];
    dhcp-mac-address [ access-request | accounting-start | accounting-stop ];
    output-filter [ accounting-start | accounting-stop ];
    event-timestamp [ accounting-on | accounting-off | accounting-start | accounting-stop
      ];
    framed-ip-address [ accounting-start | accounting-stop ];
    framed-ip-netmask [ accounting-start | accounting-stop ];
    input-filter [ accounting-start | accounting-stop ];
    input-gigapackets [ accounting-stop ];
    input-gigawords [ accounting-stop ];
    interface-description [ access-request | accounting-start | accounting-stop ];
    nas-identifier [ access-request | accounting-on | accounting-off | accounting-start |
      accounting-stop ];
    nas-port [ access-request | accounting-start | accounting-stop ];
    nas-port-id [ access-request | accounting-start | accounting-stop ];
    nas-port-type [ access-request | accounting-start | accounting-stop ];
    output-gigapackets [ accounting-stop ];
    output-gigawords [ accounting-stop ];
  }
  ignore {
    framed-ip-netmask;
    input-filter;
    logical-system-routing-instance;
    output-filter;
  }
}
```

Hierarchy Level [edit access profile *profile-name* radius]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Specify how the router or switch processes RADIUS attributes.

The statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring How RADIUS Attributes Are Used for Subscriber Access on page 30

authenticate

Syntax

```
authenticate {
  order (aaa | local);
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* services **mobile-ip**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip**],
[edit routing-instances *routing-instances-name* services **mobile-ip**],
[edit services **mobile-ip**]

Release Information

Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services mobile-ip]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip]**, and **[edit routing-instances *routing-instances-name* services mobile-ip]** hierarchy levels added in Junos OS Release 9.5.

Description

Define the authentication method performed for Mobile IP.

The remaining statement is explained separately.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Mobile IP on page 315
- Configuring the Access Type for Mobile IP on page 322

authentication (DHCP Local Server)

Syntax

```
authentication {
    password password-string;
    username-include {
        circuit-type;
        client-id;
        delimiter delimiter-character;
        domain-name domain-name-string;
        logical-system-name;
        mac-address;
        option-60;
        option-82 <circuit-id> <remote-id>;
        relay-agent-interface-id;
        relay-agent-remote-id;
        relay-agent-subscriber-id;
        routing-instance-name;
        user-prefix user-prefix-string;
    }
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server dhcpv6**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server dhcpv6 group** *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server group** *group-name*],
[edit logical-systems *logical-system-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server dhcpv6**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server dhcpv6 group** *group-name*],
[edit logical-systems *logical-system-name* system services **dhcp-local-server group** *group-name*],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server dhcpv6**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server dhcpv6 group** *group-name*],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server group** *group-name*],
[edit system services **dhcp-local-server**],
[edit system services **dhcp-local-server dhcpv6**],
[edit system services **dhcp-local-server dhcpv6 group** *group-name*],
[edit system services **dhcp-local-server group** *group-name*]

Release Information

Statement introduced in Junos OS Release 9.1.

Description

Configure the parameters the router sends to the external AAA server. A group configuration takes precedence over a global DHCP relay or DHCP local server configuration.

The statements are explained separately. The **client-id**, **relay-agent-interface-id**, **relay-agent-remote-id** and **relay-agent-subscriber-id** statements are supported for DHCPv6 only.

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

authentication (DHCP Relay Agent)

Syntax

```
authentication {
  password password-string;
  username-include {
    circuit-type;
    delimiter delimiter-character;
    domain-name domain-name-string;
    logical-system-name;
    mac-address;
    option-60;
    option-82 [circuit-id] [remote-id];
    routing-instance-name;
    user-prefix user-prefix-string;
  }
}
```

Hierarchy Level
[edit forwarding-options **dhcp-relay**],
[edit forwarding-options dhcp-relay **group** *group-name*],
[edit logical-systems *logical-system-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* forwarding-options **group** *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name*],
[edit routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name*]

Release Information
Statement introduced in Junos OS Release 9.1.

Description
Configure the parameters the router sends to the external AAA server. A group configuration takes precedence over a global DHCP relay or DHCP local server configuration.

The 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
- Using External AAA Authentication Services with DHCP on page 96

authentication (Static Subscribers)

Syntax

```
authentication {
    password password-string;
    username-include {
        domain-name domain-name;
        interface;
        logical-system-name;
        routing-instance-name;
        user-prefix user-prefix-string;
    }
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services **static-subscribers**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers **group** *group-name*],
[edit logical-systems *logical-system-name* system services **static-subscribers**],
[edit logical-systems *logical-system-name* system services static-subscribers **group** *group-name*],
[edit routing-instances *routing-instances-name* system services **static-subscribers**],
[edit routing-instances *routing-instances-name* system services static-subscribers **group** *group-name*],
[edit system services **static-subscribers**],
[edit system services static-subscribers **group** *group-name*]

Release Information

Statement introduced in Junos OS Release 9.6.

Description

Specify the authentication parameters that trigger the Access-Request message to AAA for all static subscribers on interfaces configured at the **[edit system services static-subscribers interface]** hierarchy level, or for the static subscribers in a specific group. The group version of this statement overrides the global configuration.

Options

profile-name—Name of the static subscriber access profile.

The remaining statements are explained separately.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259
- Configuring the Static Subscriber Global Authentication Password on page 265
- Configuring the Static Subscriber Group Authentication Password on page 268

authentication-order

Syntax authentication-order [*authentication-methods*];

Hierarchy Level [edit access **profile** *profile-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Set the order in which the Junos OS tries different authentication methods when verifying that a client can access the router or switch. For each login attempt, the software tries the authentication methods in order, from first to last.

Default **password**

Options **password**—Verify the client using the information configured at the **[edit access profile *profile-name* client *client-name*]** hierarchy level.

radius—Verify the client using RADIUS authentication services.

NOTE: For subscriber access management, you must always specify the **radius** method. Subscriber access management does not support the **password** keyword (the default), and authentication fails when no method is specified.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Specifying the Authentication and Accounting Methods for Subscriber Access on page 20
- Configuring Access Profiles for L2TP or PPP Parameters
- Example: Configuring CHAP Authentication with RADIUS

authentication-server

Syntax authentication-server [*ip-address*];

Hierarchy Level [edit access **profile** *profile-name* **radius**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify a list of the RADIUS authentication servers used to authenticate DHCP, L2TP, and PPP clients. The servers in the list are also used as RADIUS dynamic-request servers, from which the router accepts and processes RADIUS disconnect requests, CoA requests, and dynamic service activations and deactivations.

Options ***ip-address***—The IPv4 address.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring RADIUS Server Parameters for Subscriber Access on page 26

authorization-order

Syntax authorization-order jsrc;

Hierarchy Level [edit access profile *profile-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure AAA to use JSRC in an SRC environment to request authorization from the SAE when verifying that a DHCP subscriber can access the router. When you include this statement, AAA ignores any configured authentication order settings. This statement is ignored for non-DHCP subscribers.

Options jsrc—Application used to communicate with the SAE for subscriber authorization. JSRC is the only application that is currently available.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring JSRC on page 251
- Authorizing Subscribers with JSRC on page 253

autonomous (Dynamic Router Advertisement)

Syntax (autonomous | no-autonomous);

Hierarchy Level [edit dynamic-profiles *profile-name* protocols router-advertisement interface *interface-name* prefix *prefix*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Specify whether prefixes in the router advertisement messages are used for stateless address autoconfiguration:

- **autonomous**—Use prefixes for address autoconfiguration.
- **no-autonomous**—Do not use prefixes for address autoconfiguration.

Default autonomous

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring the Prefix Information Included in Neighbor Discovery Advertisements

boot-file

Syntax boot-file *filename*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet **dhcp-attributes**]

Release Information Statement introduced in Junos OS Release 9.0.

Description Set the boot file advertised to DHCP clients. After the client receives an IP address and the boot file location from the DHCP server, the client uses the boot image stored in the boot file to complete DHCP setup. This is equivalent to DHCP option 67.

Options ***filename***—The location of the boot file on the boot server. The filename can include a pathname.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Address-Assignment Pools on page 56
- **boot-server on page 796**

boot-server

Syntax boot-server (*address* | *hostname*);

Hierarchy Level [edit access address-assignment pool *pool-name* family inet **dhcp-attributes**]

Release Information Statement introduced in Junos OS Release 9.0.

Description Configure the name of the boot server advertised to DHCP clients. The client uses a boot file located on the boot server to complete DHCP setup. This is equivalent to DHCP option 66.

Options
- ***address***—The IPv4 address of a boot server.
- ***hostname***—The fully qualified hostname of a boot server.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Address-Assignment Pools on page 56
- **boot-file on page 795**

buffer-size (Dynamic Scheduling)

Syntax buffer-size (percent *percentage* | remainder | temporal *microseconds* | $junos-cos-scheduler-bs);

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service schedulers** *scheduler-name*]

Release Information Statement introduced in Junos OS Release 9.3.
The **$junos-cos-scheduler-bs** predefined variable added in Junos OS Release 9.4.

Description Specify buffer size.

Default If you do not include this statement, the default scheduler transmission rate and buffer size percentages for queues 0 through 7 are 95, 0, 0, 5, 0, 0, 0, and 0 percent.

Options

percent *percentage*—Buffer size as a percentage of total buffer.

remainder—Remaining buffer available.

temporal *microseconds*—Buffer size as a temporal value. The queuing algorithm starts dropping packets when it queues more than a computed number of bytes. This maximum is computed by multiplying the logical interface speed by the configured temporal value.

Range: The ranges vary by platform as follows:

- For IQ PICs on M320 routers: 1 through 50,000 microseconds.
- For IQ PICs on other M Series routers: 1 through 100,000 microseconds.
- For other M Series routers: 1 through 200,000 microseconds.

$junos-scheduler-bx—Junos predefined variable that is replaced with the buffer size obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 611
- **scheduler (Dynamic Scheduler Maps) on page 1084**

captive-portal-content-delivery

Syntax

```
captive-portal-content-delivery {
  rule rule-name {
    match-direction (input | output | input-output);
    term term-name {
      from {
        application [junos-http, junos-https, junos-httpproxy];
        destination-address address <except>;
        destination-prefix-listlist-name <except>;
      }
      then {
        action;
        action-modfiers;
      }
    }
  }
  rule-set rule-set-name {
    [rule rule-names];
  }
}
```

Hierarchy Level [edit services]

Release Information Statement introduced in Junos OS Release 10.4.

Description Configure the HTTP redirect service by specifying the location to which a subscriber's initial Web browser session is redirected, enabling initial provisioning and service selection for the subscriber.

Options The statements are explained separately.

Required Privilege Level services—To view this statement in the configuration.
services–control—To add this statement to the configuration.

Related Documentation

- Redirecting HTTP Requests on page 545

captive-portal-content-delivery-rule

Syntax captive-portal-content-delivery-rule *rule-name*;

Hierarchy Level [edit services service-set *name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Identify the HTTP rule for inclusion in a service set.

Options ***rule-name***—Identifier for the rule.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Redirecting HTTP Requests on page 545

captive-portal-content-delivery-rule-set

Syntax captive-portal-content-delivery-rule-set *rule-set-name*;

Hierarchy Level [edit services service-set *name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Identify the HTTP rule set for inclusion in a service set.

Options ***rule-set-name***—Identifier for the rule set.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Redirecting HTTP Requests on page 545

chap (Dynamic PPP)

Syntax chap;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces pp0 unit** "$junos-interface-unit" **ppp-options**]

Release Information Statement introduced in Junos OS Release 9.5.

Description Specify CHAP authentication in a PPP dynamic profile.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Dynamic Profiles Overview on page 325
- Configuring Dynamic Authentication for PPP Subscribers on page 199
- Attaching Dynamic Profiles to Static PPP Subscriber Interfaces on page 203

circuit-id (Address-Assignment Pools)

Syntax circuit-id *value* range *named-range*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes option-match option-82]

Release Information Statement introduced in Junos OS Release 9.0.

Description Configure the address-assignment pool named-range to use for a particular option 82 Agent Circuit ID value.

Options
- ***value***—The string for the Agent Circuit ID suboption (suboption 1) of the DHCP relay agent information option (option 82) in DHCP packets.
- **range *named-range***—The name of the address-assignment pool range to use.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Address-Assignment Pools on page 56

circuit-id (DHCP Relay Agent)

Syntax

```
circuit-id {
    prefix prefix;
    use-interface-description (logical | device);
}
```

Hierarchy Level

[edit forwarding-options dhcp-relay **relay-option-82**],
[edit forwarding-options dhcp-relay group *group-name* **relay-option-82**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **relay-option-82**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **relay-option-82**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **relay-option-82**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **relay-option-82**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **relay-option-82**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **relay-option-82**]

Release Information

Statement introduced in Junos OS Release 8.3.

Description

Include the Agent Circuit ID suboption (suboption 1) of the DHCP relay agent information option (option 82) in DHCP packets destined for a DHCP server. Optionally specify that the suboption include a prefix or textual description, or both, instead of the circuit-id.

The format of the Agent Circuit ID information for Fast Ethernet or Gigabit Ethernet interfaces that do not use virtual local area networks (VLANs) or stacked VLANs (S-VLANs) is as follows:

(fe | ge)-*fpc/pic/port*

The format of the Agent Circuit ID information for Fast Ethernet or Gigabit Ethernet interfaces that use VLANs is as follows:

(fe | ge)-*fpc/pic/port*:*vlan-id*

The format of the Agent Circuit ID information for Fast Ethernet or Gigabit Ethernet interfaces that use S-VLANs is as follows:

(fe | ge)-*fpc/pic/port*:*svlan-id-vlan-id*

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

- Enabling and Disabling Insertion of Option 82 Information on page 172
- Configuring Agent Circuit ID Information on page 173

circuit-type (DHCP Local Server)

Syntax circuit-type;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit system services **dhcp-local-server authentication username-include**],
[edit system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit system services dhcp-local-server **group** *group-name* **authentication username-include**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify that the circuit type is concatenated with the username during the subscriber authentication process.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

circuit-type (DHCP Relay Agent)

Syntax circuit-type;

Hierarchy Level
[edit forwarding-options dhcp-relay authentication **username-include**],
[edit forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify that the circuit type is concatenated with the username during the subscriber authentication process.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

class-of-service (Dynamic Profiles)

Syntax class-of-service { ... }

Hierarchy Level [edit **dynamic-profiles** *profile-name*]

Release Information Statement introduced in Junos OS Release 9.2.

Description Configure Junos CoS features in a dynamic profile.

Default If you do not configure any CoS features, all packets are transmitted from output transmission queue 0.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 601
- Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 603

classifiers (Dynamic CoS Application)

Syntax

```
classifiers {
  dscp (classifier-name | default);
  dscp-ipv6 (classifier-name | default);
  ieee-802.1 (classifier-name | default) vlan-tag (inner | outer)
  inet-precedence (classifier-name | default);
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Apply a CoS behavior aggregate classifier to a dynamic interface. You can apply a default classifier or one that is previously defined.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Applying a Classifier to a Subscriber Interface in a Dynamic Profile on page 618
- classifiers (Definition)

clear-on-abort (DHCP Local Server)

Syntax clear-on-abort;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **reconfigure**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **reconfigure**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit system services dhcp-local-server **reconfigure**],
[edit system services dhcp-local-server dhcpv6 **reconfigure**],
[edit system services dhcp-local-server group *group-name* **reconfigure**],
[edit system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**]

Release Information Statement introduced in Junos OS Release 10.0.
The **[edit ... dhcpv6 ...]** hierarchies added in Junos OS Release 10.4.

Description Delete all DHCP clients or only the DHCP clients serviced by the specified group of interfaces when reconfiguration fails; that is, when the maximum number of retry attempts have been made without success. A group configuration takes precedence over a DHCP local server configuration.

Default Restores the original client configuration when reconfiguration fails.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 117
- Configuring Deletion of the Client When Dynamic Reconfiguration Fails on page 119

client-accounting-algorithm

Syntax client-accounting-algorithm (direct | round-robin);

Hierarchy Level [edit access profile *profile-name* radius **options**]

Release Information Statement introduced in Junos OS Release 10.0.

Description Configure the access method the router uses to access RADIUS accounting servers.

Default **direct**

Options **direct**—Use the direct method.

round-robin—Use the round-robin method.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring RADIUS Server Parameters for Subscriber Access on page 26
- Configuring RADIUS Server Options for Subscriber Access on page 29

client-authentication-algorithm

Syntax client-authentication-algorithm (direct | round-robin);

Hierarchy Level [edit access profile *profile-name* radius **options**]

Release Information Statement introduced in Junos OS Release 10.0.

Description Configure the access method the router uses to access RADIUS authentication servers.

Default **direct**

Options **direct**—Use the direct method.

round-robin—Use the round-robin method.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring RADIUS Server Parameters for Subscriber Access on page 26
- Configuring RADIUS Server Options for Subscriber Access on page 29

client-discover-match (DHCP Local Server)

Syntax client-discover-match <option60-and-option82>;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **overrides**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **overrides**],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **overrides**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **overrides**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **overrides**],
[edit system services dhcp-local-server **overrides**],
[edit system services dhcp-local-server group *group-name* **overrides**]
[edit system services dhcp-local-server group *group-name* interface *interface-name* **overrides**]

Release Information Statement introduced in Junos OS Release 9.4.

Description Configure DHCP local server to use option 60 and option 82 information to uniquely identify DHCP subscribers when primary subscriber identification fails. The statement always uses the **option60-and-option82** option. Specifying the option is has no effect.

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Extended DHCP Local Server Overview on page 84
- Overriding Default DHCP Local Server Configuration Settings on page 101

client-discover-match (DHCP Relay Agent)

Syntax client-discover-match <option60-and-option82>;

Hierarchy Level
[edit forwarding-options dhcp-relay **overrides**],
[edit forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**]
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* interface *interface-name* **overrides**]

Release Information Statement introduced in Junos OS Release 9.4.

Description Configure DHCP relay to use option 60 and option 82 information to uniquely identify DHCP subscribers when primary subscriber identification fails. The statement always uses the **option60-and-option82** option. Specifying the option is has no effect.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Extended DHCP Relay Agent Overview on page 136
- Overriding the Default DHCP Relay Configuration Settings on page 150

client-id

Syntax client-id;

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**],
[edit system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify that the DHCPv6 Client-ID option (option 1) in the client PDU name is concatenated with the username during the subscriber authentication process.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Creating Unique Usernames for DHCP Clients on page 111

coa-immediate-update

Syntax coa-immediate-update;

Hierarchy Level [edit access profile *profile-name* **accounting**]

Release Information Statement introduced in Junos OS Release 10.0.

Description Configure the router to send an Acct-Update message to the RADIUS accounting server immediately following a CoA operation.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring RADIUS Server Parameters for Subscriber Access on page 26
- Configuring Per-Subscriber Session Accounting on page 24

connect-actively

Syntax

```
connect-actively {
  port port-number;
}
```

Hierarchy Level [edit diameter peer *peer-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Define the destination port used to establish active connections to Diameter peer.

The remaining statement is explained separately.

Default By default, port 3868 and an automatically assigned local address are used to establish active connections to a peer.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Diameter on page 233
- Configuring Diameter Peers on page 234

current-hop-limit (Dynamic Router Advertisement)

Syntax current-hop-limit *number*;

Hierarchy Level [edit dynamic-profiles protocols router-advertisement interface *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Default value placed in the hop count field of the IP header for outgoing packets.

Options *number*—Hop limit. A value of 0 means the limit is unspecified by this router.
Range: 0 through 255
Default: 64

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring the Hop Count in Outgoing Neighbor Discovery Packets

default-lifetime (Dynamic Router Advertisement)

Syntax default-lifetime *seconds*;

Hierarchy Level [edit protocols router-advertisement interface *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Lifetime associated with a default router.

Options ***seconds***—Default lifetime. A value of 0 means this router is not the default router.
Range: Maximum advertisement interval value through 9000 seconds
Default: Three times the maximum advertisement interval value

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- max-advertisement-interval
- Configuring the Lifetime for the Default Neighbor Discovery Router

default-local-server-group

Syntax default-local-server-group *local-server-group-name*;

Hierarchy Level [edit forwarding-options dhcp-relay relay-option-60 **vendor-option**],
[edit forwarding-options dhcp-relay group *group-name* relay-option-60 **vendor-option**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay relay-option-60 **vendor-option**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* relay-option-60 **vendor-option**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 **vendor-option**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 **vendor-option**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 **vendor-option**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 **vendor-option**]

Release Information Statement introduced in Junos OS Release 9.0.

Description Forward DHCP client packets to a default extended DHCP local server when you use the DHCP vendor class identifier option (option 60) in DHCP packets to forward client traffic to specific DHCP servers.

If the option 60 string received in the DHCP client packet does not match the ASCII or hexadecimal match string and match criteria (exact match or partial match) that you specify, the extended DHCP relay agent forwards the client packets to the specified default DHCP local server group configured with the **dhcp-local-server** statement at the **[edit system services]** hierarchy level.

Options ***local-server-group-name***—Name of the default extended DHCP local server group.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 169

default-relay-server-group

Syntax default-relay-server-group *server-group-name*;

Hierarchy Level
[edit forwarding-options dhcp-relay relay-option-60 **vendor-option**],
[edit forwarding-options dhcp-relay group *group-name* relay-option-60 **vendor-option**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay relay-option-60 **vendor-option**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* relay-option-60 **vendor-option**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 **vendor-option**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 **vendor-option**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 **vendor-option**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 **vendor-option**]

Release Information Statement introduced in Junos OS Release 9.0.

Description Relay DHCP client packets to a default group of extended DHCP relay servers when you use the DHCP vendor class identifier option (option 60) in DHCP packets to forward client traffic to specific DHCP servers.

If the option 60 string received in the DHCP client packet does not match the ASCII or hexadecimal match string and match criteria (exact match or partial match) that you specify, the extended DHCP relay agent relays the client packets to the specified default group of servers configured with the **server-group** statement at the **[edit forwarding-options dhcp-relay]** hierarchy level.

Options *server-group-name*—Name of the default DHCP relay server group.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 169

default-value

Syntax default-value *default-value*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **variables** *variable-name*]

Release Information Statement introduced in Junos OS Release 9.3.

Description Configure a default value for a user-defined variable in a dynamic profile. The values that the system uses for these variables are applied when the subscriber authenticates.

Options ***default-value***—Default value for the variable.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring User-Defined CoS Variables in a Dynamic Service Profile on page 630

delay-buffer-rate (Dynamic Traffic Shaping)

Syntax delay-buffer-rate (percent *percentage* | *rate* | $junos-cos-delay-buffer-rate);

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service traffic-control-profiles** *profile-name*]

Release Information Statement introduced in Junos OS Release 9.2.
The **$junos-cos-delay-buffer-rate** variable added in Junos OS Release 9.4.

Description Base the delay-buffer calculation on a delay-buffer rate.

Default If you do not include this statement, the delay-buffer calculation is based on the guaranteed rate if one is configured, or the shaping rate if no guaranteed rate is configured.

Options ***rate***—Delay-buffer rate, in bits per second (bps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation **k** (1000), **m** (1,000,000), or **g** (1,000,000,000).

Range: 1000 through 160,000,000,000 bps

$junos-cos-delay-buffer-rate—Junos predefined variable that is replaced with the delay-buffer rate obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Traffic Scheduling and Shaping for Subscriber Access on page 609
- **output-traffic-control-profile on page 1005**

delimiter (DHCP Local Server)

Syntax delimiter *delimiter-character*;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server dhcpv6 group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server dhcpv6 group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server dhcpv6 group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server group** *group-name* **authentication username-include**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server dhcpv6 authentication username-include**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server dhcpv6 group** *group-name* **authentication username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit system services **dhcp-local-server authentication username-include**],
[edit system services **dhcp-local-server dhcpv6 authentication username-include**],
[edit system services **dhcp-local-server dhcpv6 group** *group-name* **authentication username-include**],
[edit system services **dhcp-local-server group** *group-name* **authentication username-include**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify the character used as the delimiter between the concatenated components of the username. The semicolon (;) cannot be used as a delimiter.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

delimiter (DHCP Relay Agent)

Syntax delimiter *delimiter-character*;

Hierarchy Level [edit forwarding-options dhcp-relay authentication **username-include**],
[edit forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify the character used as the delimiter between the concatenated components of the username. You cannot use the semicolon (;) as a delimiter.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

delimiter (Domain Maps)

Syntax delimiter [*delimiter-character*];

Hierarchy Level [edit access **domain**]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the characters that the router uses to separate usernames from domain names.

Default The @ character is the default delimiter.

Options ***delimiter-character***—One or more characters used as delimiters. You can specify a maximum of eight delimiters. You cannot use the semicolon (;) as a delimiter. Do not include spaces between characters.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Specifying Domain Name Delimiters on page 72
- Configuring Domain Name Usage for Domain Maps on page 71

demux0

Syntax

```
demux0 {
  unit logical-unit-number {
    demux-options {
      underlying-interface interface-name
    }
    family family {
      address address;
      demux-source {
        source-prefix;
      }
      filter {
        input filter-name;
        output filter-name;
      }
      mac-validate (loose | strict):
      unnumbered-address interface-name preferred-source-address address;
    }
    filter {
      input filter-name;
      output filter-name;
    }
    vlan-id number;
  }
}
```

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces**]

Release Information Statement introduced in Junos OS Release 9.3.

Description Configure the logical demultiplexing (demux) interface in a dynamic profile.

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 Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 403
- For information about static IP demux interfaces, see the *Junos OS Network Interfaces Configuration Guide*

demux-options

Syntax

```
demux–options {
  underlying-interface interface-name
}
```

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces demux0** *interface-name* **unit** *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 9.3.

Description Configure logical demultiplexing (demux) interface options in a dynamic profile.

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

- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 403
- For information about static IP demux interfaces, see the *Junos OS Network Interfaces Configuration Guide*

demux-source (Dynamic IP Demux Interface)

Syntax

```
demux-source {
  source-address;
}
```

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces demux0 unit** *logical-unit-number* **family** *family*]

Release Information Statement introduced in Junos OS Release 9.3.

Description Configure a logical demultiplexing (demux) source address for a subscriber in a dynamic profile.

Options ***source-address***—Either the specific source address you want to assign to the subscriber interface or the source address variable. For IPv4, specify **$junos-subscriber-ip-address**; for IPv6, specify **$junos-subscriber-ipv6-address**). The source address for the interface is dynamically supplied by DHCP when the subscriber accesses the router.

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 Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 403
- For information about static IP demux interfaces, see the *Junos OS Network Interfaces Configuration Guide*

demux-source (Dynamic Underlying Interface)

Syntax demux-source *family*;

Hierarchy Level [edit **dynamic-profiles interfaces***interface-name* **unit***logical-unit-number*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure the logical demultiplexing (demux) source family type on the IP demux underlying interface within a dynamic profile.

NOTE: The IP demux interface feature currently supports only Fast Ethernet, Gigabit Ethernet, 10-Gigabit Ethernet, or aggregated Ethernet underlying interfaces.

Options ***family***—Protocol family:

- **inet**—Internet Protocol version 4 suite
- **inet6**—Internet Protocol version 6 suite

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

destination (Diameter Base Protocol)

Syntax destination realm *realm-name* <host *hostname*>;

Hierarchy Level [edit **diameter network-element** *element-name* **forwarding route** *dne-route-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Associate the route with all hosts of the specified realm or with a specific host of the specified realm. Together with the function and metric, defines a route reachable through a Diameter network element.

Options **host** ***hostname***—(Optional) Name of the destination host associated with the route.

realm ***realm-name***—Name of the destination realm associated with the route.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Diameter on page 233
- Configuring Diameter Network Elements on page 235

destination (Dynamic PPPoE)

Syntax destination *address*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces pp0 unit** "$junos-interface-unit" **family** inet **unnumbered-address** *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description For dynamic PPPoE interfaces, specify the IP address of the remote interface.

Options ***address***—IP address of the remote interface.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring a PPPoE Dynamic Profile with Additional Options on page 471
- For information about creating static PPPoE interfaces, see the *Junos OS Network Interfaces Configuration Guide*

destination-address

Syntax destination-address *address* <except>;

Hierarchy Level [edit **services captive-portal-content-delivery rule** *rule-name* **term** *term-name* **from**]

Release Information Statement introduced in Junos OS Release 10.4.
address option enhanced to support IPv4 and IPv6 addresses in Junos OS Release 8.5.

Description Specify the destination address for rule matching.

Options ***address***—Destination IPv4 or IPv6 address or prefix value.

except—(Optional) Exclude the specified prefix list from rule matching.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Redirecting HTTP Requests on page 545

destination-host

Syntax destination-host *hostname*

Hierarchy Level [edit **jsrc partition** *partition-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure the host on which the SAE application resides.

Options ***hostname***—Host on which the SAE is installed. JSRC places no limitation on the content of the *hostname* string.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring JSRC on page 251
- Configuring the JSRC Partition on page 252

destination-host (PTSP)

Syntax destination-host *hostname*;

Hierarchy Level [edit system services **packet-triggered-subscribers partition** *partition-name*]

Release Information Statement introduced in Junos OS Release 10.2.

Description Configure the host on which the SAE application resides.

Options ***hostname***—Host on which the SAE is installed. PTSP places no limitation on the content of the *hostname* string.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring the PTSP Partition on page 284

destination-prefix-list

Syntax destination-prefix-list *list-name* <except>;

Hierarchy Level [edit **services** captive-portal-content-delivery **rule** *rule-name* **term** *term-name* **from**]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the destination prefix list for rule matching. You configure the prefix list by including the **prefix-list** statement at the **[edit policy-options]** hierarchy level.

Options ***list-name***—Destination prefix list.

except—(Optional) Exclude the specified prefix list from rule matching.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Redirecting HTTP Requests on page 545
- *Junos OS Policy Framework Configuration Guide*

destination-profile (Dynamic PPPoE)

Syntax destination-profile *profile-name*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces pp0 unit** "$junos-interface-unit" **family** inet **unnumbered-address** *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description For dynamic PPPoE interfaces, assign PPP properties to the remote end.

Options ***profile-name***—Name of the PPP group profile defined at the **[edit access group-profile *profile-name* ppp]** 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 a PPPoE Dynamic Profile with Additional Options on page 471
- For information about creating static PPPoE interfaces, see the *Junos OS Network Interfaces Configuration Guide*
- For information about PPP group profiles, see the *Junos OS System Basics Configuration Guide*

destination-realm (JSRC)

Syntax destination-realm *realm*

Hierarchy Level [edit **jsrc partition** *partition-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure the realm in which the SAE host resides.

Options ***realm***—Realm in which the SAE host resides. JSRC places no limitation on the content of the ***realm*** string.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring JSRC on page 251
- Configuring the JSRC Partition on page 252

destination-realm (PTSP)

Syntax destination-realm *realm*

Hierarchy Level [edit system services **packet-triggered-subscribers partition** *partition-name*]

Release Information Statement introduced in Junos OS Release 10.2.

Description Configure the realm in which the SAE host resides.

Options ***realm***—Realm in which the SAE host resides. PTSP places no limitation on the content of the ***realm*** string.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring the PTSP Partition on page 284

dhcp-attributes (Address-Assignment Pools)

Syntax

```
dhcp-attributes {
  boot-file filename;
  boot-server (address | hostname);
  dns-server [ ipv6-address ];
  domain-name domain-name;
  grace-period seconds;
  maximum-lease-time seconds;
  name-server [ server-list ];
  netbios-node-type node-type;
  option {
    [ (id-number option-type option-value)
    (id-number array option-type option-value) ];
  }
  option-match {
    option-82 {
      circuit-id value range named-range;
      remote-id value range named-range;
    }
  }
  router [ router-address ];
  server-identifier ip4-address;
  sip-server-address [ ipv6-address ];
  sip-server-domain-name domain-name;
  tftp-server address;
  wins-server [ servers ];
}
```

Hierarchy Level [edit access address-assignment **pool** *pool-name* **family** *family*]

Release Information Statement introduced in Junos OS Release 9.0.

Description Configure address pools that can be used by different client applications.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56
- Configuring DHCP Client-Specific Attributes on page 59

dhcp-local-server

Syntax

```
dhcp-local-server {
  authentication {
    password password-string;
    username-include {
      circuit-type;
      delimiter delimiter-character;
      domain-name domain-name-string;
      logical-system-name;
      mac-address;
      option-60;
      option-82 <circuit-id> <remote-id>;
      routing-instance-name;
      user-prefix user-prefix-string;
    }
  }
  dhcpv6 {
    authentication {
      ...
    }
    group group-name {
      authentication {
        ...
      }
      interface interface-name {
        exclude;
        overrides {
          interface-client-limit number;
        }
        trace;
        upto upto-interface-name;
      }
      overrides {
        interface-client-limit number;
      }
    }
    overrides {
      interface-client-limit number;
    }
  }
  duplicate-clients-on-interface;
  dynamic-profile profile-name <aggregate-clients (merge | replace) | use-primary
    primary-profile-name>;
  forward-snooped-clients (all-interfaces | configured-interfaces |
    non-configured-interfaces);
  group group-name {
    authentication {
      ...
    }
    dynamic-profile profile-name <aggregate-clients (merge | replace) | use-primary
      primary-profile-name>;
    interface interface-name {
      exclude;
```

```
        overrides {
          client-discover-match <option60-and-option82>;
          interface-client-limit number;
          no-arp;
        }
        trace;
        upto upto-interface-name;
      }
      overrides {
        client-discover-match <option60-and-option82>;
        interface-client-limit number;
        no-arp;
      }
    }
    interface-traceoptions {
      file <filename> <files number> <match regular-expression > <size size> <world-readable
        | no-world-readable>;
      flag flag;
      no-remote-trace;
    }
    overrides {
      client-discover-match <option60-and-option82>;
      interface-client-limit number;
      no-arp;
    }
    pool-match-order {
      external-authority;
      ip-address-first;
      option-82;
    }
    traceoptions {
      file filename <files number> <match regular-expression> <size size> <world-readable |
        no-world-readable>;
      flag flag;
      no-remote-trace;
    }
  }
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services],
[edit logical-systems *logical-system-name* system services],
[edit routing-instances *routing-instance-name* system services],
[edit system services]

Release Information

Statement introduced in Junos OS Release 9.0.

Description Configure Dynamic Host Configuration Protocol (DHCP) local server options on the router and enable the router to function as an extended DHCP local server. The DHCP local server receives DHCP request and reply packets from DHCP clients and then responds with an IP address and other optional configuration information to the client.

The DHCP local server supports the attachment of dynamic profiles and also interacts with the local AAA Service Framework to use back-end authentication servers, such as RADIUS, to provide subscriber authentication. You can configure dynamic profile and authentication support on a global basis or for a specific group of interfaces.

The DHCP local server also supports the use of Junos address-assignment pools or external authorities, such as RADIUS, to provide the client address and configuration information.

The extended DHCP local server is incompatible with the DHCP server on J Series routers and so is not supported on J Series routers. Also, the DHCP local server and the DHCP/BOOTP relay server, which are configured under the **[edit forwarding-options helpers]** hierarchy level, cannot both be enabled on the router at the same time. The extended DHCP local server is fully compatible with the extended DHCP relay feature.

The **dhcpv6** stanza configures the router to support Dynamic Host Configuration Protocol for IPv6 (DHCPv6). The DHCPv6 local server is fully compatible with the extended DHCP local server and the extended DHCP relay feature.

NOTE: When you configure the dhcp-local-server statement at the routing instance hierarchy level, you must use a routing instance type of virtual-router.

The remaining statements are explained separately.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Extended DHCP Local Server Overview on page 84
- DHCPv6 Local Server Overview on page 88

dhcp-relay

Syntax

```
dhcp-relay {
  authentication {
    password password-string;
    username-include {
      circuit-type;
      delimiter delimiter-character;
      domain-name domain-name-string;
      logical-system-name;
      mac-address;
      option-60;
      option-82 [circuit-id] [remote-id];
      routing-instance-name;
      user-prefix user-prefix-string;
    }
  }
  duplicate-clients-on-interface;
  dynamic-profile profile-name <aggregate-clients (merge | replace) | use-primary
    primary-profile-name>;
  forward-snooped-clients (all-interfaces | configured-interfaces |
    non-configured-interfaces);
  interface-traceoptions {
    file <filename> <files number> <match regular-expression > <size size> <world-readable
      | no-world-readable>;
    flag flag;
    no-remote-trace;
  }
  overrides {
    allow-snooped-clients;
    always-write-giaddr;
    always-write-option-82;
    client-discover-match <option60-and-option82>;
    disable-relay;
    interface-client-limit number;
    layer2-unicast-replies;
    no-allow-snooped-clients;
    no-arp;
    no-bind-on-request;
    proxy-mode;
    replace-ip-source-with; giaddr
    send-release-on-delete;
    trust-option-82;
  }
  relay-option-60 {
    vendor-option {
      (equals | starts-with) (ascii match-string | hexadecimal match-hex) {
        default-local-server-group local-server-group-name |
        (default-relay-server-group server-group-name |
        drop);
      }
      default-local-server-group local-server-group-name |
      (default-relay-server-group server-group-name |
      drop);
```

```
    }
  }
  relay-option-82 {
    circuit-id {
      prefix prefix;
      use-interface-description (logical | device);
    }
  }
  server-group {
    server-group-name {
      server-ip-address;
    }
  }
  active-server-group server-group-name;
  group group-name {
    active-server-group server-group-name;
    authentication {
      ...
    }
    dynamic-profile profile-name <aggregate-clients (merge | replace) | use-primary
      primary-profile-name>;
    overrides {
      ...
    }
    relay-option-60 {
      ...
    }
    relay-option-82 {
      ...
    }
    interface interface-name {
      exclude;
      overrides {
        ...
      }
      trace;
      upto upto-interface-name;
    }
  }
  traceoptions {
    file file-name {
      <files number>;
      <size maximum-file-size>;
      <match regex>;
      <world-readable | no-world-readable>;
    }
    flag flag;
    no-remote-trace;
  }
}
```

Hierarchy Level [edit forwarding-options],
[edit logical-systems *logical-system-name* forwarding-options],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options],
[edit routing-instances *routing-instance-name* forwarding-options]

Release Information Statement introduced in Junos OS Release 8.3.

Description Configure extended Dynamic Host Configuration Protocol (DHCP) relay options on the router and enable the router to function as a DHCP relay agent. A DHCP relay agent forwards DHCP request and reply packets between a DHCP client and a DHCP server.

DHCP relay supports the attachment of dynamic profiles and also interacts with the local AAA Service Framework to use back-end authentication servers, such as RADIUS, to provide subscriber authentication. You can attach dynamic profiles and configure authentication support on a global basis or for a specific group of interfaces.

The extended DHCP relay agent options configured with the **dhcp-relay** statement are incompatible with the DHCP/BOOTP relay agent options configured with the **bootp** statement. As a result, the extended DHCP relay agent and the DHCP/BOOTP relay agent cannot both be enabled on the router at the same time.

The 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

- Extended DHCP Relay Agent Overview on page 136
- DHCP Relay Proxy Overview on page 138
- Using External AAA Authentication Services with DHCP on page 96

dhcpv6

Syntax

```
dhcpv6 {
  authentication {
    password password-string;
    username-include {
      circuit-type;
      client-id;
      delimiter delimiter-character;
      domain-name domain-name-string;
      logical-system-name;
      relay-agent-interface-id;
      relay-agent-remote-id;
      relay-agent-subscriber-id;
      routing-instance-name;
      user-prefix user-prefix-string;
    }
  }
  group group-name {
    authentication {
    ...
    interface interface-name {
      exclude;
      overrides {
        interface-client-limit number;
      }
      trace;
      upto upto-interface-name;
    }
    overrides {
      interface-client-limit number;
    }
  }
  overrides {
    interface-client-limit number;
  }
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit system services **dhcp-local-server**]

Release Information

Statement introduced in Junos OS Release 9.6.

Description

Configure DHCPv6 local server options on the router and enable the router to function as a server for the DHCP protocol for IP version 6 (IPv6). The DHCPv6 local server sends and receives packets using the IPv6 protocol and informs IPv6 of the routing requirements of router clients. The local server works together with the AAA service framework to control subscriber access and accounting.

The DHCPv6 local server is fully compatible with the extended DHCP local server and DHCP relay agent.

The statements are explained separately.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- DHCPv6 Local Server Overview on page 88

diameter

Syntax

```
diameter {
  network-element element-name {
    forwarding {
      route dne-route-name {
        destination realm realm-name <host hostname>;
        function function-name <partition partition-name>;
        metric route-metric;
      }
    }
    function function-name;
    peer peer-name {
      priority priority-number;
    }
  }
  origin {
    host hostname;
    realm realm-name;
  }
  peer peer-name {
    address ip-address;
    connect-actively {
      port port-number;
    }
    logical-system logical-system-name <routing-instance routing-instance-name> ;
    routing-instance routing-instance-name;
  }
}
```

Hierarchy Level [edit]

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure the Diameter base protocol for subscriber management.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Diameter on page 233

diameter-instance (JSRC)

Syntax diameter-instance *instance-name*

Hierarchy Level [edit **jsrc partition** *partition-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify the Diameter instance associated with the JSRC partition.

Options ***instance-name***—Name of the Diameter instance. Currently, only **master** is supported.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring JSRC on page 251
- Configuring the JSRC Partition on page 252

diameter-instance (PTSP)

Syntax diameter-instance *instance-name*

Hierarchy Level [edit system services **packet-triggered-subscribers partition** *partition-name*]

Release Information Statement introduced in Junos OS Release 10.2.

Description Specify the Diameter instance associated with the PTSP partition.

Options ***instance-name***—Name of the Diameter instance. Currently, only **master** is supported.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring the PTSP Partition on page 284

disable (Dynamic IGMP)

Syntax "disable:$junos-igmp-enable";

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **igmp interface** *interface-name*],

Release Information Statement introduced in Junos OS Release 9.2.

Description Disable IGMP on the interface.

NOTE: Though the purpose of this statement is to disable IGMP on interfaces, under the **dynamic-profiles** hierarchy you can use this statement and an enable variable (**disable:$junos-igmp-enable**) to ensure that IGMP is not disabled by a AAA-based authentication and management method (RADIUS).

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring a Dynamic Profile for Client Access on page 353
- For information about disabling IGMP, see “Disabling IGMP” in the *Junos OS Multicast Protocols Configuration Guide*

disable (Dynamic MLD)

Syntax disable;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **mld interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Disable MLD on the dynamic interface.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Disabling MLD

disable-calling-number-avp (L2TP LAC)

Syntax disable-calling-number-avp;

Hierarchy Level [edit services l2tp]

Release Information Statement introduced in Junos OS Release 10.4.

Description Prevent the LAC from sending L2TP Calling Number AVP 22 in incoming-call request (ICRQ) packets to the LNS. By default, the LAC in an L2TP network generates this AVP from the Calling-Station-Id and sends it to the LNS.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Preventing the LAC From Sending Calling Number AVP 22 to the LNS on page 223

disable-relay

Syntax disable-relay;

Hierarchy Level
[edit forwarding-options dhcp-relay **overrides**],
[edit forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**]
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* interface *interface-name* **overrides**]

Release Information Statement introduced in Junos OS Release 8.3.

Description Disable DHCP relay on specific interfaces in a group.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Extended DHCP Relay Agent Overview on page 136

dns-server

Syntax dns-server *ipv6-address*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet6 **dhcp-attributes**]

Release Information Statement introduced in Junos OS Release 10.0.

Description Specify a DNS server to which clients can send DNS queries. This is equivalent to DHCPv6 option 23. To specify multiple DNS servers, add multiple **dns-server** statements in order of preference.

Options ***ipv6-address***—IPv6 address of a DNS server.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56

domain (Domain Maps)

Syntax

```
domain {
  delimiter [delimiter-character];
  map domain-map-name {
    aaa-logical-system logical-system-name {
      aaa-routing-instance routing-instance-name;
    }
    aaa-routing-instance routing-instance-name;
    access-profile profile-name;
    address-pool pool-name;
    dynamic-profile profile-name;
    padn destination-address {
      mask destination-mask;
      metric route-metric;
    }
    strip-domain;
    target-logical-system logical-system-name {
      target-routing-instance routing-instance-name;
    }
    target-routing-instance routing-instance-name;
    tunnel-profile profile-name;
  }
  parse-direction (left-to-right | right-to-left);
}
```

Hierarchy Level [edit access]

Release Information Statement introduced in Junos OS Release 10.4.

Description Configure domain maps, which are used to map access options and session parameters for subscriber sessions.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Domain Maps on page 66

domain-name (Address-Assignment Pools)

Syntax domain-name *domain-name*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet **dhcp-attributes**]

Release Information Statement introduced in Junos OS Release 9.0.

Description Configure the name of the domain in which clients search for a DHCP server host. This is the default domain name that is appended to hostnames that are not fully qualified. This is equivalent to DHCP option 15.

Options ***domain-name***—Name of the domain.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Address-Assignment Pools on page 56

domain-name (DHCP Local Server)

Syntax domain-name *domain-name-string*;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit system services **dhcp-local-server authentication username-include**],
[edit system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit system services dhcp-local-server **group** *group-name* **authentication username-include**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify the domain name that is concatenated with the username during the subscriber authentication process.

Options ***domain-name-string***—The domain name formatted string.

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

domain-name (DHCP Relay Agent)

Syntax
domain-name *domain-name-string*;

Hierarchy Level
[edit forwarding-options dhcp-relay authentication **username-include**],
[edit forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**]

Release Information
Statement introduced in Junos OS Release 9.1.

Description
Specify the domain name that is concatenated with the username during the subscriber authentication process.

Options
domain-name-string—The domain name formatted string.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

domain-name (Static Subscribers)

Syntax domain-name *domain-name*;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* system services static-subscribers authentication **username-include**],
[edit logical-systems *logical-system-name* system services static-subscribers group *group-name* authentication **username-include**],
[edit routing-instances *routing-instances-name* system services static-subscribers authentication **username-include**],
[edit routing-instances *routing-instances-name* system services static-subscribers group *group-name* authentication **username-include**],
[edit system services static-subscribers authentication **username-include**],
[edit system services static-subscribers group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify the domain name that is included at the end of the username created for all static subscribers or for the static subscribers in a specified group. The group version of the statement takes precedence over the global version.

Options *domain-name*—Domain name that ends the username created for all static subscribers. The username is also sent to RADIUS in the Access-Request message. The string can include the following characters: a through z, A through Z, 0 through 9, "-", or ".".

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Subscribers over Static Interfaces on page 259
- Configuring the Static Subscriber Global Username on page 265
- Configuring the Static Subscriber Group Username on page 269

drop

Syntax drop;

Hierarchy Level
[edit forwarding-options dhcp-relay relay-option-60 **vendor-option**],
[edit forwarding-options dhcp-relay relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit forwarding-options dhcp-relay relay-option-60 **vendor-option**],
[edit forwarding-options dhcp-relay relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay relay-option-60 vendor-option],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 vendor-option],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 vendor-option],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)]

Release Information Statement introduced in Junos OS Release 9.0.

Description Drop (discard) DHCP client packets when you use the DHCP vendor class identifier option (option 60) in DHCP packets to forward client traffic to specific DHCP servers.

To drop DHCP client packets that contain an option 60 string that matches the ASCII or hexadecimal match string and match criteria (exact match or partial match) that you specify, include the **drop** statement at the **[edit forwarding-options dhcp-relay relay-option-60 vendor-option (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)]** hierarchy level.

To drop DHCP client packets that contain an option 60 string that does *not* match the ASCII or hexadecimal match string and match criteria (exact match or partial match)

that you specify, include the **drop** statement at the **[edit forwarding-options dhcp-relay relay-option-60 vendor-option]** hierarchy level.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 169

drop-profile (Dynamic Schedulers)

Syntax drop-profile (*profile-name* | *predefined-variable*);

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service schedulers** *scheduler-name* **drop-profile-map loss-priority** (any | low | medium-low | medium-high | high) **protocol** (any | non-tcp | tcp)]

Release Information Statement introduced in Junos OS Release 9.3.
The **$junos-cos-scheduler-dropfile-low**, **$junos-cos-scheduler-dropfile-medium-low**, **$junos-cos-scheduler-dropfile-medium-high**, **$junos-cos-scheduler-dropfile-high**, and **$junos-cos-scheduler-dropfile-any** predefined variable added in Junos OS Release 9.4.

Description Within the drop-profile map, specify the name of the drop profile to use for random early detection (RED) for a specific packet-loss priority (PLP) level and protocol type. A drop profile maps a fill level (fullness of a queue) to a drop probability (probability that a packet will be dropped). When a packet arrives, RED checks the queue fill level. If the fill level corresponds to a nonzero drop probability, the RED algorithm determines whether to drop the arriving packet.

You enable RED by applying a drop profile to a scheduler.

You configure drop profiles statically (at the **[edit class-of-service drop-profiles]** hierarchy level).

Options *profile-name*—Name of the drop profile.

predefined-variable—One of the following Junos predefined variable that is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached:

- **$junos-cos-scheduler-dropfile-low**—Name of the drop profile for PLP level **low** and protocol **any**, specified for a scheduler configured in a dynamic profile for subscriber access.
- **$junos-cos-scheduler-dropfile-medium-low**—Name of the drop profile for PLP level **medium-low** and protocol **any**, specified for a scheduler configured in a dynamic profile for subscriber access.
- **$junos-cos-scheduler-dropfile-medium-high**—Name of the drop profile for PLP level **medium-high** and protocol **any**, specified for a scheduler configured in a dynamic profile for subscriber access.
- **$junos-cos-scheduler-dropfile-high**—Name of the drop profile for PLP level **high** and protocol **any**, specified for a scheduler configured in a dynamic profile for subscriber access.
- **$junos-cos-scheduler-dropfile-lny**—Name of the drop profile for PLP level **any** and protocol **any**, specified for a scheduler configured in a dynamic profile for subscriber access.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 611
- **scheduler (Dynamic Scheduler Maps) on page 1084**
- For more information about configuring drop profiles and drop-profile maps, see the *Junos OS Class of Service Configuration Guide* .

drop-profile-map (Dynamic Schedulers)

Syntax
drop-profile-map **loss-priority** (any | low | medium-low | medium-high | high) **protocol** (any | non-tcp | tcp) **drop-profile** (*profile-name* | *predefined-variable*);

Hierarchy Level
[edit **dynamic-profiles** *profile-name* **class-of-service schedulers** *scheduler-name*]

Release Information
Statement introduced in Junos OS Release 9.3.

Description
Define loss priority value for drop profile.

The 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
- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 611
- **scheduler (Dynamic Scheduler Maps) on page 1084**

dscp (Dynamic Classifiers)

Syntax dscp (*classifier-name* | default);

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* classifiers]

Release Information Statement introduced in Junos OS Release 10.1.

Description For IPv4 traffic, apply a Differentiated Services (DiffServ) code point (DSCP) classifier to a subscriber interface in a dynamic profile.

Options ***classifier-name***—Name of a **classifier** mapping configured at the **[edit class-of-service classifier dscp]** hierarchy level.

default—The default mapping.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Applying a Classifier to a Subscriber Interface in a Dynamic Profile on page 618
- classifiers (Definition)

dscp (Dynamic Rewrite Rules)

Syntax dscp (*rewrite-name* | default);

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules]

Release Information Statement introduced in Junos OS Release 10.1.

Description For IPv4 traffic, apply a Differentiated Services (DiffServ) code point (DSCP) rewrite rule to a subscriber interface in a dynamic profile.

Options ***rewrite-name***—Name of a **rewrite-rules** mapping configured at the **[edit class-of-service rewrite-rules dscp]** hierarchy level.

default—The default mapping.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Applying a Rewrite Rule Definition to a Subscriber Interface in a Dynamic Profile on page 617
- rewrite-rules

dscp-ipv6 (Dynamic Classifiers)

Syntax dscp-ipv6 (*classifier-name* | default);

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* classifiers]

Release Information Statement introduced before Junos OS Release 10.1.

Description For IPv6 traffic, apply a Differentiated Services (DiffServ) code point (DSCP) classifier to a subscriber interface in a dynamic profile.

Options ***classifier-name***—Name of a **classifier** mapping configured at the **[edit class-of-service classifier ieee-802.1]** hierarchy level.

default—The default mapping.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Applying a Classifier to a Subscriber Interface in a Dynamic Profile on page 618
- classifiers (Definition)

dscp-ipv6 (Dynamic Rewrite Rules)

Syntax dscp-ipv6 (*rewrite-name* | default);

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules]

Release Information Statement introduced before Junos OS Release10.1.

Description For IPv6 traffic, apply a DSCP rewrite rule to a subscriber interface in a dynamic profile.

Options ***rewrite-name***—Name of a **rewrite-rules** mapping configured at the **[edit class-of-service rewrite-rules dscp-ipv6]** hierarchy level.

default—The default mapping.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- rewrite-rules

duplicate-clients-on-interface (DHCP Local Server)

Syntax duplicate-clients-on-interface;

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit system services **dhcp-local-server**]

Release Information Statement introduced in Junos OS Release 10.2.

Description Configure DHCP local server to include the client subinterface when distinguishing between duplicate DHCP clients (clients with the same MAC address or client ID) in the same subnet. By default, DHCP distinguishes clients by subnet. This feature is supported on DHCPv4 only.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring DHCP Duplicate Client Support on page 95

duplicate-clients-on-interface (DHCP Relay Agent)

Syntax duplicate-clients-on-interface;

Hierarchy Level [edit forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit routing-instances *routing-instance-name* forwarding-options **dhcp-relay**]

Release Information Statement introduced in Junos OS Release 10.2.

Description Configure DHCP relay agent to include the client subinterface when distinguishing between duplicate DHCP clients (clients with the same MAC address or client ID) in the same subnet. By default, DHCP relay distinguishes clients by subnet. This feature is supported on DHCPv4 only.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring DHCP Duplicate Client Support on page 95
- Enabling and Disabling Insertion of Option 82 Information on page 172

duplicate-protection (Dynamic PPPoE)

Syntax duplicate-protection;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* **pppoe-underlying-options**],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* **pppoe-underlying-options**]

Release Information Statement introduced in Junos OS Release 10.1.

Description Prevent the activation of another dynamic PPPoE logical interface on the same underlying interface when a dynamic PPPoE logical interface for a client with the same media access control (MAC) address is already active on that interface. Duplicate protection is disabled by default. Enabling duplicate protection has no effect on dynamic PPPoE logical interfaces that are already active.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces on page 473
- For information about creating static PPPoE interfaces, see the *Junos OS Network Interfaces Configuration Guide*

dynamic-home-assignment

Syntax

```
dynamic-home-assignment {
  home-agent {
    nai (name@domain.com | @domain.com) {
      home-agent ip-address;
    }
  }
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* services **mobile-ip**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip**],
[edit routing-instances *routing-instances-name* services **mobile-ip**],
[edit services **mobile-ip**]

Release Information

Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services mobile-ip]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip]**, and **[edit routing-instances *routing-instances-name* services mobile-ip]** hierarchy levels added in Junos OS Release 9.5.

Description

Define the dynamic assignment rule for the home agent.

The remaining statements are explained separately.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Mobile IP on page 315
- Configuring Dynamic Home Assignment for the Mobile Node on page 321

dynamic-profile (DHCP Local Server)

Syntax dynamic-profile *profile-name* <**aggregate-clients** (merge | replace) | **use-primary** *primary-profile-name*>;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name*],
[edit logical-systems *logical-system-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **group** *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name*],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name*],
[edit system services **dhcp-local-server**],
[edit system services dhcp-local-server **group** *group-name*]

Release Information Statement introduced in Junos OS Release 9.2.
aggregate-clients and **use-primary** options introduced in Junos OS Release 9.3.

Description Specify the dynamic profile that is attached to a group of interfaces or to all interfaces.

The remaining statements are explained separately.

Options ***profile-name***—Name of the dynamic profile.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109

dynamic-profile (DHCP Relay Agent)

Syntax dynamic-profile *profile-name* <**aggregate-clients** (merge | replace) | **use-primary** *primary-profile-name*>;

Hierarchy Level [edit forwarding-options **dhcp-relay**],
[edit forwarding-options dhcp-relay **group** *group-name*],
[edit logical-systems *logical-system-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* forwarding-options **group** *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name*],
[edit routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name*]

Release Information Statement introduced in Junos OS Release 9.2.
aggregate-clients and **use-primary** statements introduced in Junos OS Release 9.3.

Description Specify the dynamic profile that is attached to a group of interfaces or to all interfaces.

The statements are explained separately.

Options ***profile-name***—Name of the dynamic profile.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109

dynamic-profile (Domain Maps)

Syntax dynamic-profile *profile-name*;

Hierarchy Level [edit access domain **map** *domain-map-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Dynamic profile that is used for subscriber sessions associated with the domain map.

Options ***profile-name***—Name of dynamic profile.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Specifying a Dynamic Profile in a Domain Map on page 68

dynamic-profile (Dynamic PPPoE)

Syntax dynamic-profile *profile-name*;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* **pppoe-underlying-options**],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* **pppoe-underlying-options**]

Release Information Statement introduced in Junos OS Release 10.1.

Description Attach a PPPoE dynamic profile to an underlying Ethernet interface configured with PPPoE (**ppp-over-ether**) encapsulation. When the router creates a dynamic PPPoE logical interface on the underlying interface, it uses the information in the dynamic profile to determine the properties of the dynamic PPPoE logical interface.

Options ***profile-name***—Name of a previously configured PPPoE dynamic profile, up to 64 characters in length, defined at the **[edit dynamic-profiles *profile-name* interfaces pp0]** 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 an Underlying Interface for Dynamic PPPoE Subscriber Interfaces on page 473
- For information about creating static PPPoE interfaces, see the *Junos OS Network Interfaces Configuration Guide*

dynamic-profile (PPP)

Syntax dynamic-profile *profile-name*;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* **ppp-options**]

Release Information Statement introduced in Junos OS Release 9.5.
Support for MLPPP on LSQ interfaces added in Junos OS Release 10.2

Description Specify the dynamic profile that is attached to the interface. On the MX series routers, this statement is currently supported on PPPoE interfaces only. On the M120 and M320 routers, this statement is supported for MLPPP bundles only on LSQ interfaces on Adaptive Services PICs and Multiservices PICs.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Dynamic Profiles Overview on page 325
- Configuring a Basic Dynamic Profile on page 349
- Attaching Dynamic Profiles to Static PPP Subscriber Interfaces on page 203
- Attaching Dynamic Profiles to MLPPP Bundles on page 207
- For hardware requirements, see Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces on page 206

dynamic-profile (PPPoE Service Name Tables)

Syntax dynamic-profile *profile-name*;

Hierarchy Level [edit protocols pppoe service-name-tables *table-name* service *service-name*],
[edit protocols pppoe service-name-tables *table-name* service *service-name* agent-specifier aci *circuit-id-string* ari *remote-id-string*]

Release Information Statement introduced in Junos OS Release 10.2.

Description Specify a dynamic profile to instantiate a dynamic PPPoE interface. You can associate a dynamic profile with a named service entry, **empty** service entry, or **any** service entry configured in a PPPoE service name table, or with an agent circuit identifier/agent remote identifier (ACI/ARI) pair defined for these services.

The dynamic profile associated with a service entry in a PPPoE service name table overrides the dynamic profile associated with the PPPoE underlying interface on which the dynamic PPPoE interface is created.

If you include the **dynamic-profile** statement at the **[edit protocols pppoe service-name-tables *table-name* service *service-name* agent-specifier aci *circuit-id-string* ari *remote-id-string*]** hierarchy level, you cannot also include the **static-interface** statement at this level. The **dynamic-profile** and **static-interface** statements are mutually exclusive for ACI/ARI pair configurations.

Options ***profile--name***—Name of the dynamic profile that the router uses to instantiate a dynamic PPPoE interface.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring PPPoE Service Name Tables
- Assigning a Dynamic Profile and Routing Instance to a Service Name or ACI/ARI Pair for Dynamic PPPoE Interface Creation on page 475

dynamic-profile (Static Subscribers)

Syntax

```
dynamic-profile profile-name {
    aggregate-clients (merge | replace);
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services **static-subscribers**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers **group** *group-name*],
[edit logical-systems *logical-system-name* system services **static-subscribers**],
[edit logical-systems *logical-system-name* system services static-subscribers **group** *group-name*],
[edit routing-instances *routing-instances-name* system services **static-subscribers**],
[edit routing-instances *routing-instances-name* system services static-subscribers **group** *group-name*],
[edit system services **static-subscribers**],
[edit system services static-subscribers **group** *group-name*]

Release Information

Statement introduced in Junos OS Release 9.6.

Description

Specify the dynamic client profile that is instantiated at login and de-instantiated at logout for all static subscribers on interfaces configured at the **[edit system services static-subscribers interface]** hierarchy level or for the static subscribers in a specific group. The group version of the statement takes precedence over the global version.

NOTE: Do not specify a dynamic profile that creates a dynamic interface.

Default

By default, the *junos-default-profile* is used when you do not specify a global dynamic profile with this statement.

Options

profile-name—Name of the dynamic client profile profile.

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

- Configuring Subscribers over Static Interfaces on page 259
- Specifying the Static Subscriber Global Dynamic Profile on page 264
- Specifying the Static Subscriber Group Dynamic Profile on page 267

dynamic-profiles

Syntax

```
dynamic-profiles {
  profile-name {
    class-of-service {
      interfaces {
        interface-name ;
        }
        unit logical-unit-number {
          classifiers {
            type (classifier-name | default);
          }
          output-traffic-control-profile profile-name;
          rewrite-rules {
            dscp (rewrite-name | default);
            dscp-ipv6 (rewrite-name | default);
            ieee-802.1 (rewrite-name | default) vlan-tag (outer | outer-and-inner);
            inet-precedence (rewrite-name | default);
            }
          }
        }
      }
      scheduler-maps {
        map-name {
          forwarding-class class-name scheduler scheduler-name;
        }
      }
      schedulers {
        (scheduler-name) {
          buffer-size (seconds | percent percentage | remainder | temporal microseconds);
          drop-profile-map loss-priority (any | low | medium-low | medium-high | high)
            protocol (any | non-tcp | tcp) drop-profile profile-name;
          excess-priority (low | high | $junos-cos-scheduler-excess-priority);
          excess-rate (percent percentage | percent $junos-cos-scheduler-excess-rate);
          overhead-accounting (shaping-mode) <bytes (byte-value>;
          priority priority-level;
          shaping-rate (rate | predefined-variable);
          transmit-rate (percent percentage | rate | remainder) <exact | rate-limit>;
        }
      }
      traffic-control-profiles profile-name {
        delay-buffer-rate (percent percentage | rate | $junos-cos-delay-buffer-rate);
        excess-rate (percent percentage | proportion value | percent $junos-cos-excess-rate);
        guaranteed-rate (percent percentage | rate | $junos-cos-guaranteed-rate);
        overhead-accounting (shaping-mode) <bytes (byte-value>;
        scheduler-map map-name;
        shaping-rate (rate | predefined-variable);
      }
    }
    firewall {
      family family {
        fast-update-filter filter-name {
          interface-specific;
          match-order [match-order];
```

```
        term term-name {
          from {
            match-conditions;
          }
          then {
            action;
            action-modifiers;
          }
          only-at-create;
        }
      }
    }
}
interfaces interface-name {
    pp0 { ... }
    unit logical-unit-number {
      encapsulation (atm-ccc-cell-relay | atm-ccc-vc-mux | atm-cisco-nlpid |
        atm-tcc-vc-mux | atm-mlppp-llc | atm-nlpid | atm-ppp-llc | atm-ppp-vc-mux |
        atm-snap | atm-tcc-snap | atm-vc-mux | ether-over-atm-llc |
        ether-vpls-over-atm-llc | ether-vpls-over-fr | ether-vpls-over-ppp | ethernet |
        frame-relay-ccc | frame-relay-ppp | frame-relay-tcc | frame-relay-ether-type |
        frame-relay-ether-type-tcc | multilink-frame-relay-end-to-end | multilink-ppp |
        ppp-over-ether | ppp-over-ether-over-atm-llc | vlan-bridge | vlan-ccc | vlan-vci-ccc
        | vlan-tcc | vlan-vpls);
      family family {
        address address;
        filter {
          adf {
            counter;
            input-precedence precedence;
            output-precedence precedence;
            rule rule-value;
          }
          input filter-name (
            precedence precedence;
          }
          output filter-name {
            precedence precedence;
          }
        }
        service {
          input {
            service-set service-set-name {
              service-filter filter-name;
            }
            post-service-filter filter-name;
          }
          input-vlan-map {
            inner-tag-protocol-id tpid;
            inner-vlan-id number;
            (push | swap);
            tag-protocol-id tpid;
            vlan-id number;
          }
          output {
            service-set service-set-name {
```

```
                service-filter filter-name;
              }
            }
            output-vlan-map {
              inner-tag-protocol-id tpid;
              inner-vlan-id number;
              (pop | swap);
              tag-protocol-id tpid;
              vlan-id number;
            }
          }
          unnumbered-address interface-name preferred-source-address address;
        }
        ppp-options {
          chap;
          pap;
        }
        vlan-id number;
        vlan-tags outer [tpid].vlan-id [inner [tpid].vlan-id];
      }
    }
    protocols {
      igmp {
        interface interface-name {
          accounting;
          disable;
          group-policy;
          immediate-leave
          no-accounting;
          promiscuous-mode;
          ssm-map ssm-map-name;
          static {
            group group {
              source source;
            }
          }
          version version;
        }
        mld {
          interfaceinterface-name {
            disable;
            (accounting | no-accounting);
            group-policy;
            immediate-leave;
            oif-map;
            passive;
            ssm-map ssm-map-name;
            static {
              group multicast-group-address {
                exclude;
                group-count number;
                group-increment increment;
                source ip-address {
                  source-count number;
                  source-increment increment;
                }
```

```
            }
          }
          version version;
        }
      }
      router-advertisement {
        interface interface-name {
          current-hop-limit number;
          default-lifetime seconds;
          (managed-configuration | no-managed-configuration);
          max-advertisement-interval seconds;
          min-advertisement-interval seconds;
          (other-stateful-configuration | no-other-stateful-configuration);
          prefix prefix;
          reachable-time milliseconds;
          retransmit-timer milliseconds;
        }
      }
    }
}
routing-instances {
  interface interface-name;
}
routing-options {
  access {
    route prefix {
      next-hop next-hop;
      metric route-cost;
      preference route-distance;
      tag route-tag;
    }
  }
  access-internal {
    route subscriber-ip-address {
      qualified-next-hop underlying-interface {
        mac-address address;
      }
    }
  }
  multicast {
    interface interface-name {
      no-qos-adjust;
    }
  }
}
variables {
  variable-name {
    mandatory;
    default-value default-value;
    radius {
      vendor-id id {
        attribute attribute-number;
        tag tag-number;
      }
    }
  }
```

```
    }
  }
}
```

Hierarchy Level [edit]

Release Information Statement introduced in Junos OS Release 9.2.

Description Create dynamic profiles for use with DHCP or PPP client access.

Options ***profile-name***—Name of the dynamic profile.

The remaining statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Dynamic Profiles Overview on page 325
- Configuring a Basic Dynamic Profile on page 349

enable-service

Syntax enable-service *interface-name*;

Hierarchy Level [edit logical-systems *logical-system-name* services **mobile-ip home-agent**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip home-agent**],
[edit routing-instances *routing-instances-name* services **mobile-ip home-agent**],
[edit services **mobile-ip home-agent**]

Release Information Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services mobile-ip home-agent]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip home-agent]**, and **[edit routing-instances *routing-instances-name* services mobile-ip home-agent]** hierarchy levels added in Junos OS Release 9.5.

Description Define the list of interfaces on which the home agent service can be enabled. The system accepts registration requests only if it is on one of these interfaces. Include the statement once for each interface to be enabled.

Options ***interface-name***—Interface on which the home agent can be enabled.

Required Privilege Level view—To view this statement in the configuration.
view-control—To add this statement to the configuration.

Related Documentation
- Configuring Mobile IP on page 315
- Configuring the Mobile IP Home Agent on page 319

encapsulation (Dynamic Interfaces)

Syntax encapsulation (atm-ccc-cell-relay | atm-ccc-vc-mux | atm-cisco-nlpid | atm-tcc-vc-mux | atm-mlppp-llc | atm-nlpid | atm-ppp-llc | atm-ppp-vc-mux | atm-snap | atm-tcc-snap | atm-vc-mux | ether-over-atm-llc | ether-vpls-over-atm-llc | ether-vpls-over-fr | ether-vpls-over-ppp | ethernet | frame-relay-ccc | frame-relay-ppp | frame-relay-tcc | frame-relay-ether-type | frame-relay-ether-type-tcc | multilink-frame-relay-end-to-end | multilink-ppp | ppp-over-ether | ppp-over-ether-over-atm-llc | vlan-bridge | vlan-ccc | vlan-vci-ccc | vlan-tcc | vlan-vpls);

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Dynamic interface configuration of the logical link-layer encapsulation type.

Options **atm-ccc-cell-relay**—Use ATM cell-relay encapsulation.

atm-ccc-vc-mux—Use ATM virtual circuit (VC) multiplex encapsulation on circuit cross-connect (CCC) circuits. When you use this encapsulation type, you can configure the **ccc** family only.

atm-cisco-nlpid—Use Cisco ATM network layer protocol ID (NLPID) encapsulation. When you use this encapsulation type, you can configure the **inet** family only.

atm-mlppp-llc—For ATM2 IQ interfaces only, use Multilink Point-to-Point Protocol (MLPPP) over AAL5 LLC. For this encapsulation type, your router must be equipped with a link services or voice services PIC. MLPPP over ATM encapsulation is not supported on ATM2 IQ OC48 interfaces.

atm-nlpid—Use ATM NLPID encapsulation. When you use this encapsulation type, you can configure the **inet** family only.

atm-ppp-llc—For ATM2 IQ interfaces only, use PPP over AAL5 LLC encapsulation.

atm-ppp-vc-mux—For ATM2 IQ interfaces only, use PPP over ATM AAL5 multiplex encapsulation.

atm-snap—Use ATM subnetwork attachment point (SNAP) encapsulation.

atm-tcc-snap—Use ATM SNAP encapsulation on translational cross-connect (TCC) circuits.

atm-tcc-vc-mux—Use ATM VC multiplex encapsulation on TCC circuits. When you use this encapsulation type, you can configure the **tcc** family only.

atm-vc-mux—Use ATM VC multiplex encapsulation. When you use this encapsulation type, you can configure the **inet** family only.

ether-over-atm-llc—For interfaces that carry IPv4 traffic, use Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure multipoint interfaces.

ether-vpls-over-atm-llc—For ATM2 IQ interfaces only, use the Ethernet virtual private LAN service (VPLS) over ATM LLC encapsulation to bridge Ethernet interfaces and ATM interfaces over a VPLS routing instance (as described in RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*). Packets from the ATM interfaces are converted to standard ENET2/802.3 encapsulated Ethernet frames with the frame check sequence (FCS) field removed.

ether-vpls-over-fr—For E1, T1, E3, T3, and SONET interfaces only, use the Ethernet virtual private LAN service (VPLS) over Frame Relay encapsulation to support Bridged Ethernet over Frame Relay encapsulated TDM interfaces for VPLS applications, as per *Multiprotocol Interconnect over Frame Relay* (RFC 2427 [1490]).

ether-vpls-over-ppp—For E1, T1, E3, T3 and SONET interfaces only, use the Ethernet virtual private LAN service (VPLS) over PPP encapsulation to support Bridged Ethernet over PPP encapsulated TDM interfaces for VPLS applications.

ethernet—Use Ethernet II encapsulation (as described in RFC 894, *A Standard for the Transmission of IP Datagrams over Ethernet Networks*).

ethernet-vpls—Use Ethernet VPLS encapsulation on Ethernet interfaces that have VPLS enabled and that must accept packets carrying standard Tag Protocol ID (TPID) values.

extended-vlan-vpls—Use extended virtual LAN (VLAN) VPLS encapsulation on Ethernet interfaces that have VLAN 802.1Q tagging and VPLS enabled and that must accept packets carrying TPIDs 0x8100, 0x9100, and 0x9901.

NOTE: The built-in Gigabit Ethernet PIC on an M7i router does not support extended VLAN VPLS encapsulation.

frame-relay-ccc—Use Frame Relay encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

frame-relay-ppp—Use PPP over Frame Relay circuits. When you use this encapsulation type, you can configure the **ppp** family only. J Series routers do not support **frame-relay-ppp** encapsulation.

frame-relay-tcc—Use Frame Relay encapsulation on TCC circuits for connecting unlike media. When you use this encapsulation type, you can configure the **tcc** family only.

frame-relay-ether-type—Use Frame Relay ether type encapsulation for compatibility with Cisco Frame Relay. The physical interface must be configured with **flexible-frame-relay** encapsulation.

frame-relay-ether-type-tcc—Use Frame Relay ether type TCC for Cisco-compatible Frame Relay on TCC circuits to connect unlike media. The physical interface must be configured with **flexible-frame-relay** encapsulation.

multilink-frame-relay-end-to-end—Use MLFR FRF.15 encapsulation. This encapsulation is used only on multilink, link services,and voice services interfaces and their constituent T1 or E1 interfaces, and is supported on LSQ and redundant LSQ interfaces.

multilink-ppp—Use MLPPP encapsulation. This encapsulation is used only on multilink, link services, and voice services interfaces and their constituent T1 or E1 interfaces.

ppp-over-ether—For underlying Ethernet interfaces on J Series Services routers, use PPP over Ethernet encapsulation. When you use this encapsulation type, you cannot configure the interface address. Instead, configure the interface address on the PPP interface. You also use PPP over Ethernet encapsulation to configure an underlying Ethernet interface for a dynamic PPPoE logical interface on M120 and M320 Series routers with Intelligent Queuing 2 (IQ2) PICs, and on MX Series routers with Trio MPC/MIC interfaces.

ppp-over-ether-over-atm-llc—For underlying ATM interfaces on J Series Services routers only, use PPP over Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure the interface address. Instead, configure the interface address on the PPP interface.

vlan-bridge—Use Ethernet VLAN bridge encapsulation on Ethernet interfaces that have IEEE 802.1Q tagging, flexible ethernet services, and bridging enabled, and that must accept packets carrying TPID 0x8100 or a user-defined TPID.

vlan-ccc—Use Ethernet virtual LAN (VLAN) encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

vlan-vci-ccc—Use ATM-to-Ethernet interworking encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

vlan-tcc—Use Ethernet VLAN encapsulation on TCC circuits. When you use this encapsulation type, you can configure the **tcc** family only.

vlan-vpls—Use Ethernet VLAN encapsulation on VPLS circuits.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring a Retail Dynamic Profile for use in the Layer 2 Wholesale Solution
- *Junos OS Services Interfaces Configuration Guide*

entity-type

Syntax entity-type (host | mobility-agent);

Hierarchy Level [edit logical-systems *logical-system-name* services **mobile-ip peer spi** *hexadecimal-value*],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip peer spi** *hexadecimal-value*],
[edit routing-instances *routing-instances-name* services **mobile-ip peer spi** *hexadecimal-value*],
[edit services **mobile-ip peer spi** *hexadecimal-value*]

Release Information Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services mobile-ip peer spi *hexadecimal-value*]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip peer spi *hexadecimal-value*]**, and **[edit routing-instances *routing-instances-name* services mobile-ip peer spi *hexadecimal-value*]** hierarchy levels added in Junos OS Release 9.5.

Description Configure the security parameter for the peer entity, either a mobile node, home agent, or foreign agent.

Options **host**—Mobile node in home agent

mobility-agent—Home agent or foreign agent

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Mobile IP on page 315
- Configuring the Mobile IP Home Agent on page 319

ethernet-port-type-virtual

Syntax ethernet-port-type-virtual;

Hierarchy Level [edit access profile *profile-name* radius **options**]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Specify the physical port type the router or switch uses to authenticate clients. The router or switch passes a port type of **ethernet** in RADIUS attribute 61 (NAS-Port-Type) by default. This statement specifies a port type of **virtual**.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring RADIUS Server Options for Subscriber Access on page 29
- Configuring RADIUS Server Parameters for Subscriber Access on page 26

excess-priority (Dynamic Schedulers)

Syntax excess-priority (low | high | $junos-cos-scheduler-excess-priority);

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service schedulers** *scheduler-name*]

Release Information Statement introduced in Junos OS Release 10.2.

Description Determine the priority of excess bandwidth traffic on a scheduler in a dynamic profile.

Options
low—Excess traffic for this scheduler has low priority.

high—Excess traffic for this scheduler has high priority.

$junos-cos-scheduler-excess-priority—Variable for the excess-priority that is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Managing Excess Bandwidth Distribution for Dynamic CoS on page 687
- **scheduler on page 1084**

excess-rate (Dynamic Schedulers)

Syntax excess-rate percent (*percentage* | $junos-cos-scheduler-excess-rate);

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service schedulers** *scheduler-name*]

Release Information Statement introduced in Junos OS Release 10.2.

Description Determine the percentage of excess bandwidth traffic to share.

Options ***percentage***—Percentage of the excess bandwidth to share.

Range: 0 through 100 percent

$junos-cos-scheduler-excess-rate—Variable for the excess rate that is specified for a scheduler. The variable is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Managing Excess Bandwidth Distribution for Dynamic CoS on page 687
- **output-traffic-control-profile on page 1005**

excess-rate (Dynamic Traffic Shaping)

Syntax excess-rate ((percent *percentage* | $junos-cos-excess-rate) | proportion *value*);

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service traffic-control-profiles** *profile-name*]

Release Information Statement introduced in Junos OS Release 10.2.

Description Determine the percentage or proportion of excess bandwidth traffic to share.

Options

percentage—Percentage of the excess bandwidth to share.

Range: 0 through 100 percent

value—Proportion of the excess bandwidth to share.

Range: 0 through 1000

$junos-cos-excess-rate—Variable for the excess rate that is specified for the logical interface. The variable is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Managing Excess Bandwidth Distribution for Dynamic CoS on page 687
- **output-traffic-control-profile on page 1005**

exclude

Syntax

```
exclude {
  accounting-authentic [ accounting-on | accounting-off ];
  accounting-delay-time [ accounting-on | accounting-off ];
  accounting-session-id [ access-request | accounting-on | accounting-off | accounting-stop
    ];
  accounting-terminate-cause [ accounting-off ];
  called-station-id [ access-request | accounting-start | accounting-stop ];
  calling-station-id [ access-request | accounting-start | accounting-stop ];
  class [ accounting-start | accounting-stop ];
  dhcp-gi-address [ access-request | accounting-start | accounting-stop ];
  dhcp-mac-address [ access-request | accounting-start | accounting-stop ];
  output-filter [ accounting-start | accounting-stop ];
  event-timestamp [ accounting-on | accounting-off | accounting-start | accounting-stop
    ];
  framed-ip-address [ accounting-start | accounting-stop ];
  framed-ip-netmask [ accounting-start | accounting-stop ];
  input-filter [ accounting-start | accounting-stop ];
  input-gigapackets [ accounting-stop ];
  input-gigawords [ accounting-stop ];
  interface-description [ access-request | accounting-start | accounting-stop ];
  nas-identifier [ access-request | accounting-on | accounting-off | accounting-start |
    accounting-stop ];
  nas-port [ access-request | accounting-start | accounting-stop ];
  nas-port-id [ access-request | accounting-start | accounting-stop ];
  nas-port-type [ access-request | accounting-start | accounting-stop ];
  output-gigapackets [ accounting-stop ];
  output-gigawords [ accounting-stop ];
}
```

Hierarchy Level [edit access profile *profile-name* radius **attributes**]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Configure the router or switch 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 router or switch 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**—RADIUS attribute 45, Acct-Authentic.
- **accounting-delay-time**—RADIUS attribute 41, Acct-Delay-Time.
- **accounting-session-id**—RADIUS attribute 44, Acct-Session-Id.
- **accounting-terminate-cause**—RADIUS attribute 49, Acct-Terminate-Cause.
- **called-station-id**—RADIUS attribute 30, Called-Station-Id.

- **calling-station-id**—RADIUS attribute 31, Calling-Station-Id.
- **class**—RADIUS attribute 25, Class.
- **dhcp-gi-address**—Juniper VSA 26-57, DHCP-GI-Address.
- **dhcp-mac-address**—Juniper VSA 26-56, DHCP-MAC-Address.
- **event-timestamp**—RADIUS attribute 55, Event-Timestamp.
- **framed-ip-address**—RADIUS attribute 8, Framed-IP-Address.
- **framed-ip-netmask**—RADIUS attribute 9, Framed-IP-Netmask.
- **input-filter**—Juniper VSA 26-10, Ingress-Policy-Name.
- **input-gigapackets**—Juniper VSA 26-42, Acct-Input-Gigapackets.
- **input-gigawords**—RADIUS attribute 52, Acct-Input-Gigawords.
- **interface-description**—Juniper VSA 26-53, Interface-Desc.
- **nas-identifier**—RADIUS attribute 32, NAS-Identifier.
- **nas-port**—RADIUS attribute 5, NAS-Port.
- **nas-port-id**—RADIUS attribute 87, NAS-Port-Id.
- **nas-port-type**—RADIUS attribute 61, NAS-Port-Type.
- **output-filter**—Juniper VSA 26-11, Egress-Policy-Name.
- **output-gigapackets**—Juniper VSA 25-43, Acct-Output-Gigapackets.
- **output-gigawords**—RADIUS attribute 53, Acct-Output-Gigawords.

RADIUS message type

- **access-request**—RADIUS Access-Accept messages.
- **accounting-off**—RADIUS Accounting-Off messages.
- **accounting-on**—RADIUS Accounting-On messages.
- **accounting-start**—RADIUS Accounting-Start messages.
- **accounting-stop**—RADIUS Accounting-Stop messages.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring RADIUS Server Parameters for Subscriber Access on page 26

exclude (Dynamic MLD Interface)

Syntax exclude;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **mld interface** *interface-name* **static group** *multicast-group-address*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Configure the group to operate in exclude mode on the dynamic interface. In exclude mode all sources except the address configured are accepted for the group. By default, the group operates in include mode.

Required Privilege Level view-level—To view this statement in the configuration.
control-level—To add this statement to the configuration.

Related Documentation
- Enabling MLD Static Group Membership

external-authority

Syntax external-authority;

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **pool-match-order**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **pool-match-order**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **pool-match-order**],
[edit system services dhcp-local-server **pool-match-order**]

Release Information Statement introduced in Junos OS Release 10.0.

Description Specify that an external authority (for example, RADIUS or Diameter) provides the address assignment.

When RADIUS is the external authority, the router uses the Framed-IPv6-Pool attribute (RADIUS attribute 100) to select the pool. When Diameter is the external authority, the router uses the Diameter counterpart of RADIUS Framed-IPv6-Pool attribute.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool To Use on page 97
- Extended DHCP Local Server Overview on page 84
- Address-Assignment Pools Overview on page 55

fail-over-within-preference (L2TP LAC)

Syntax fail-over-within-preference;

Hierarchy Level [edit services l2tp]

Release Information Statement introduced in Junos OS Release 10.4.

Description Enable L2TP LAC tunnel selection within a preference level. When the router is unable to connect to a destination at a given preference level, it attempts to connect to another destination at the same level. By default, when a connection attempt fails at one preference level, the next attempt is made at the next lower level.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring LAC Tunnel Selection Failover Within a Preference Level on page 222
- Configuring the L2TP LAC Tunnel Selection Parameters on page 222

family (Address-Assignment Pools)

Syntax

```
family family {
  dhcp-attributes {
    [protocol-specific attributes]
  }
  host hostname {
    hardware-address mac-address;
    ip-address ip-address;
  }
  network ip-prefix/<prefix-length>;
  range range-name {
    high upper-limit;
    low lower-limit;
    prefix-length prefix-length;
  }
}
```

Hierarchy Level [edit access address-assignment **pool** *pool-name*]

Release Information Statement introduced in Junos OS Release 9.0.

Description Configure the protocol family for the address-assignment pool.

Options *family*—Protocol family:

- **inet**—Internet Protocol version 4 suite
- **inet6**—Internet Protocol version 6 suite

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56

family (Dynamic Firewalls)

Syntax

```
family family {
  fast-update-filter filter-name {
    interface-specific;
    match-order [match-order];
    term term-name {
      from {
        match-conditions;
      }
      then {
        action;
        action-modifiers;
      }
      only-at-create;
    }
  }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* firewall]

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure protocol family information for firewall filters in a dynamic profile.

Options ***family***—Protocol family:

- **inet**—Internet Protocol version 4 suite
- **inet6**—Internet Protocol version 6 suite

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 Fast Update Filters on page 513

family (Dynamic IP Demux Interface)

Syntax

```
family family {
  address address;
  demux-source {
    source-address;
  }
  filter {
    input filter-name;
    output filter-name;
  }
  mac-validate (loose | strict):
  unnumbered-address interface-name preferred-source-address address;
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 9.3.

Description Configure protocol family information for the logical interface.

Options ***family***—Protocol family:

- **inet**—Internet Protocol version 4 suite
- **inet6**—Internet Protocol 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 Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 403
- For information about static IP demux interfaces, see the *Junos OS Network Interfaces Configuration Guide*

family (Dynamic PPPoE)

Syntax

```
family inet {
  unnumbered-address interface-name destination address destination-profile profile-name;
  address address;
  service {
    input {
      service-set service-set-name {
        service-filter filter-name;
      }
      post-service-filter filter-name;
    }
    output {
      service-set service-set-name {
        service-filter filter-name;
      }
    }
  }
  filter {
    input filter-name {
      precedence precedence;
    }
    output filter-name {
      precedence precedence;
    }
  }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit"]

Release Information Statement introduced in Junos 10.1.

Description Configure protocol family information for the logical interface. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.

Options ***family***—Protocol family:

- **inet**—Internet Protocol version 4 suite

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 a Basic PPPoE Dynamic Profile on page 468
- Configuring a PPPoE Dynamic Profile with Additional Options on page 471
- For information about creating static PPPoE interfaces, see the *Junos OS Network Interfaces Configuration Guide*

family (Dynamic Standard Interface)

Syntax

```
family family {
  address address;
  filter {
    adf {
      counter;
      input-precedence precedence;
      output-precedence precedence;
      rule rule-value;
    }
    input filter-name {
      precedence precedence;
    }
    output filter-name {
      precedence precedence;
    }
  }
  service {
    input {
      service-set service-set-name {
        service-filter filter-name;
      }
      post-service-filter filter-name;
    }
    output {
      service-set service-set-name {
        service-filter filter-name;
      }
    }
  }
  unnumbered-address interface-name preferred-source-address address;
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 9.2.

Description Configure protocol family information for the logical interface.

Options ***family***—Protocol family:

- **inet**—IP version 4 suite
- **inet6**—IP version 6 suite
- **vpls**—Virtual private LAN service

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

- For general information about configuring static interfaces, see the *Junos OS Network Interfaces Configuration Guide*.
- "Configuring the Protocol Family," in the *Junos OS Network Interfaces Configuration Guide*.

fast-update-filter (Dynamic Firewalls)

Syntax

```
fast-update-filter filter-name {
  interface-specific;
  match-order [match-order];
  term term-name {
    from {
      match-conditions;
    }
    then {
      action;
      action-modifiers;
    }
    only-at-create;
  }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* firewall family *family*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure fast update firewall filters in a dynamic profile.

Options ***filter-name***—Name that identifies the filter. The name can contain letters, numbers, and hyphens (-) and can be up to 64 characters long. To include spaces in the name, enclose it in quotation marks (" ").

The 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 Fast Update Filters on page 513

filter (Dynamic Firewalls)

Syntax

```
filter {
  adf {
    counter;
    input-precedence precedence;
    output-precedence precedence;
    rule rule-value;
  }
  input filter-name (
    precedence precedence;
  }
  output filter-name {
    precedence precedence;
  }
}
```

Hierarchy Level

[edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **family** *family*],
[edit **dynamic-profiles** *profile-name* **interfaces demux0 unit** *logical-unit-number* **family** *family*],
[edit **dynamic-profiles** *profile-name* **interfaces** pp0 **unit** "$junos–interface–unit" **family** *family*]

Release Information

Statement introduced in Junos OS Release 9.2.
The **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family*]** hierarchy added in Junos 10.1.

Description

Apply a dynamic filter to an interface. You can configure filters for either **family inet** or **family inet6**, and the filters can be classic filters, fast update filters, or (for the **adf** statement) Ascend-Data-Filters. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.

Options

input *filter-name*—Name of one filter to evaluate when packets are received on the interface.

output *filter-name*—Name of one filter to evaluate when packets are transmitted on the interface.

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

- For general information about configuring firewall filters, see the *Junos OS Policy Framework Configuration Guide*
- Dynamic Firewall Filters Overview on page 487
- Classic Filters Overview on page 488
- Basic Classic Filter Syntax on page 490

firewall (Dynamic Firewalls)

Syntax

```
firewall {
  family family {
    fast-update-filter filter-name {
      interface-specific;
      match-order [match-order];
      term term-name {
        from {
          match-conditions;
        }
        then {
          action;
          action-modifiers;
        }
        only-at-create;
      }
    }
  }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure firewall filters in a dynamic profile.

The 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 Fast Update Filters on page 513

forward-snooped-clients (DHCP Local Server)

Syntax forward-snooped-clients (all-interfaces | configured-interfaces | non-configured-interfaces);

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit system services **dhcp-local-server**]

Release Information Statement introduced in Junos OS Release 10.4.

Description Configure how the DHCP local server handles DHCP snooped packets on specific interfaces.

Options

all-interfaces—Perform the action on all interfaces.

configured-interfaces—Only perform the action on configured interfaces.

non-configured-interfaces—Only perform the action on nonconfigured interfaces.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Managing DHCP Snooping Support on page 156
- Configuring DHCP Snooped Packets Forwarding Support for DHCP Local Server on page 104

forward-snooped-clients (DHCP Relay Agent)

Syntax forward-snooped-clients (all-interfaces | configured-interfaces | non-configured-interfaces);

Hierarchy Level [edit forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit routing-instances *routing-instance-name* forwarding-options **dhcp-relay**]

Release Information Statement introduced in Junos OS Release 10.4.

Description Configure how DHCP relay agent handles DHCP snooped packets on specific interfaces. The router determines the DHCP snooping action to perform based on a combination of the **forward-snooped-clients** configuration and the configuration of either the **allow-snooped-clients** statement or the **no-allow-snooped-clients** statement.

The router also uses this statement to determine how to handle snooped BOOTREPLY packets received on nonconfigured interfaces.

Options **all-interfaces**—Perform the action on all interfaces.

configured-interfaces—Only perform the action on configured interfaces.

non-configured-interfaces—Only perform the action on nonconfigured interfaces.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Managing DHCP Snooping Support on page 156
- Configuring DHCP Snooping for DHCP Relay Agent on page 157

forwarding

Syntax

```
forwarding {
  route dne-route-name {
    destination realm realm-name <host hostname>;
    function function-name <partition partition-name>;
    metric route-metric;
  }
}
```

Hierarchy Level [edit **diameter network-element** *element-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Define the criteria that specify which destinations are reachable through the Diameter network element.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Diameter on page 233
- Configuring Diameter Network Elements on page 235

forwarding-class (Dynamic Scheduler Maps)

Syntax forwarding-class *class-name*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service scheduler-maps** *map-name*]

Release Information Statement introduced in Junos OS Release 9.3.

Description Associate a scheduler with a scheduler map.

Options ***class-name***—Name of the forwarding class.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 611

forwarding-class (Subscriber Secure Policy)

Syntax forwarding-class *class-name*;

Hierarchy Level [edit services **radius-flow-tap**]

Release Information Statement introduced in Junos OS Release 9.4.

Description Specify forwarding class that is applied to mirrored packets sent to a mediation device.

Options ***class-name***—Name of the forwarding class.

Required Privilege Level flow-tap—To view this statement in the configuration.
flow-tap-control—To add this statement to the configuration.

Related Documentation
- Subscriber Secure Policy Overview on page 557
- Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 567

from

Syntax
```
from {
  applications [ application-names ];
  destination-address address <except>;
  destination-prefix-list list-name <except>;
}
```

Hierarchy Level [edit **services captive-portal-content-delivery rule** *rule-name* **term** *term-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify input conditions for a captive portal term.

Options For information on match conditions, see the description of firewall filter match conditions in the *Junos OS Policy Framework Configuration Guide*.

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
- Redirecting HTTP Requests on page 545

function (Network Element)

Syntax function *function-name*;

Hierarchy Level [edit diameter **network-element** *element-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Specify the application (function) associated with a Diameter network element.

Default By default, all functions are associated with (supported by) the network element.

Options ***function-name***—Application (function) associated with the route. JSRC and packet-triggered subscribers are the applications currently supported.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Diameter on page 233
- Configuring Diameter Network Elements on page 235

gateway-name (Tunnel Profile Remote Gateway)

Syntax gateway-name *server-name*;

Hierarchy Level [edit access tunnel-profile *profile-name* tunnel *tunnel-id* **remote-gateway**]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the hostname expected by the remote gateway—the LNS—from the source gateway—the LAC—when you set up a tunnel.

Options ***server-name***—Name of the LNS.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring a Tunnel Profile for Subscriber Access on page 219

gateway-name (Tunnel Profile Source Gateway)

Syntax gateway-name *client-name*;

Hierarchy Level [edit access tunnel-profile *profile-name* tunnel *tunnel-id* **source-gateway**]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the hostname provided by the source gateway—the LAC—to the remote gateway—the LNS—when you set up a tunnel.

Options ***client-name***—Name of the LAC.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring a Tunnel Profile for Subscriber Access on page 219

generic

Syntax generic;

Hierarchy Level [edit logical-systems *logical-system-name* services **mobile-ip** access-type],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* services **mobile-ip** access-type],
[edit routing-instances *routing-instance-name* services **mobile-ip** access-type],
[edit services **mobile-ip** access-type]

Release Information Statement introduced in Junos OS Release 9.5.

Description Disable WiMAX features for Mobile IP home agent, preventing interoperation in a WiMAX environment.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Mobile IP on page 315
- Configuring the Access Type for Mobile IP on page 322

grace-period

Syntax grace-period *seconds*;

Hierarchy Level [edit access address-assignment pool *pool-name* family (inet | inet6) **dhcp-attributes**]

Release Information Statement introduced in Junos OS Release 9.0.

Description Configure the amount of time that the client retains the address lease after the lease expires. The address cannot be reassigned to another client during the grace period.

Options ***seconds***—Number of seconds the lease is retained.

Range: 0 through 4,294,967,295 seconds

Default: 0 (no grace period)

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Address-Assignment Pools on page 56

group (DHCP Local Server)

Syntax

```
group group-name {
  authentication {
    password password-string;
    username-include {
      circuit-type;
      delimiter delimiter-character;
      domain-name domain-name-string;
      logical-system-name;
      mac-address;
      option-60;
      option-82 <circuit-id> <remote-id>;
      relay-agent-remote-id;
      relay-agent-subscriber-id;
      routing-instance-name;
      user-prefix user-prefix-string;
    }
  }
  dynamic-profile profile-name <aggregate-clients (merge | replace) | use-primary
    primary-profile-name>;
  interface interface-name {
    exclude;
    overrides {
      client-discover-match <option60-and-option82>;
      interface-client-limit number;
      no-arp;
    }
    trace;
    upto upto-interface-name;
  }
  overrides {
    client-discover-match <option60-and-option82>;
    interface-client-limit number;
    no-arp;
  }
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server dhcpv6**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server dhcpv6**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server dhcpv6**],
[edit system services **dhcp-local-server**],
[edit system services **dhcp-local-server dhcpv6**]

Release Information

Statement introduced in Junos OS Release 9.0.

Description

Configure a group of interfaces that have a common configuration, such as authentication parameters. A group must contain at least one interface.

Options *group-name*—Name of the group.

The remaining statements are explained separately.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Extended DHCP Local Server Overview on page 84
- Grouping Interfaces with Common DHCP Configurations on page 98
- Using External AAA Authentication Services with DHCP on page 96
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109

group (DHCP Relay Agent)

Syntax

```
group group-name {
  active-server-group server-group-name;
  authentication {
    password password-string;
    username-include {
      circuit-type;
      delimiter delimiter-character;
      domain-name domain-name-string;
      logical-system-name;
      mac-address;
      option-60;
      option-82 [circuit-id] [remote-id];
      routing-instance-name;
      user-prefix user-prefix-string;
    }
  }
  dynamic-profile profile-name <aggregate-clients (merge | replace) | use-primary
    primary-profile-name>;
  overrides {
    allow-snooped-clients;
    always-write-giaddr;
    always-write-option-82;
    client-discover-match <option60-and-option82>;
    disable-relay;
    interface-client-limit number;
    layer2-unicast-replies;
    no-allow-snooped-clients;
    no-arp;
    proxy-mode;
    replace-ip-source-with;
    send-release-on-delete;
    trust-option-82;
  }
  relay-option-60 {
    vendor-option {
      (equals | starts-with) (ascii match-string | hexadecimal match-hex) {
        (default-relay-server-group server-group-name |
        default-local-server-group local-server-group-name |
        drop);
      }
      (default-relay-server-group server-group-name |
      default-local-server-group local-server-group-name |
      drop);
    }
  }
  relay-option-82 {
    circuit-id {
      prefix prefix;
      use-interface-description (logical | device);
    }
  }
  interface interface-name {
```

```
    exclude;
    overrides {
      ...
    }
    trace;
    upto upto-interface-name;
  }
}
```

Hierarchy Level

[edit forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit routing-instances *routing-instance-name* forwarding-options **dhcp-relay**]

Release Information

Statement introduced in Junos OS Release 8.3.

Description

Specify the name of a group of interfaces that have a common DHCP relay agent configuration. A group must contain at least one interface.

The statements configured at the **[edit forwarding-options dhcp-relay group *group-name*]** hierarchy level apply only to the named group of interfaces, and override any global DHCP relay agent settings configured with the same statements at the **[edit forwarding-options dhcp-relay]** hierarchy level.

Options

group-name—Name of a group of interfaces that have a common DHCP relay agent configuration.

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

- Extended DHCP Relay Agent Overview on page 136
- Grouping Interfaces with Common DHCP Configurations on page 98
- Using External AAA Authentication Services with DHCP on page 96
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109

group (Dynamic IGMP Interface)

Syntax

For group configuration with a source, use the following syntax:

```
group ip-address {
  source ip-address;
}
```

For group configuration without a source, use the following syntax:

```
group group;
```

Hierarchy Level

[edit dynamic-profiles *profile-name* protocols **igmp interface** *interface-name* **static**],

Release Information

Statement introduced in Junos OS Release 9.2.

Description

When configuring with a source address, configure the IGMP multicast group address that receives data on an interface and a source address for certain packets. For configuration without a source address, configure only the IGMP multicast group address that receives data on an interface.

Options

ip-address—Group IP address.

group—Name of group.

NOTE: You must specify a unique address for each group.

Required Privilege Level

routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring a Dynamic Profile for Client Access on page 353
- For information about configuring static group membership, see “Enabling IGMP Static Group Membership” in the *Junos OS Multicast Protocols Configuration Guide*

group (Dynamic MLD Interface)

Syntax

```
group multicast-group-address {
  exclude;
  group-count number;
  group-increment increment;
  source ip-address {
    source-count number;
    source-increment increment;
  }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **mld interface** *interface-name* **static**]

Release Information Statement introduced in Junos OS Release 10.1.

Description The MLD multicast group address and (optionally) the source address for the multicast group being dynamically configured on an interface.

Options ***multicast-group-address***—Address of the group.

NOTE: You must specify a unique address for each group.

The remaining statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Enabling MLD Static Group Membership

group (Static Subscribers)

Syntax

```
group group-name {
  access-profile profile-name;
  dynamic-profile profile-name {
    aggregate-clients (merge | replace);
  }
  authentication {
    password password-string;
    username-include {
      domain-name domain-name;
      interface;
      logical-system-name;
      routing-instance-name;
      user-prefix user-prefix-string;
    }
  }
  interface interface-name <exclude> <upto upto-interface-name>;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* system services **static-subscribers**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services **static-subscribers**],
[edit routing-instances *routing-instances-name* system services **static-subscribers**],
[edit system services **static-subscribers**]

Release Information

Statement introduced in Junos OS Release 9.6.

Description

Configure a static subscriber group with values that override the values configured at the **[edit system services static-subscribers]** hierarchy level for subscribers outside the group. Includes the subscriber access and dynamic profiles, the authentication parameters that trigger the Access-Request message to AAA for static subscribers in the group, and the statically configured interfaces that form the group.

NOTE: The logical system and routing instance in which the group is configured must match the logical system and routing instance where the static interfaces are configured.

Options

group-name—Name of a group that defines authentication parameters for static subscribers to override the global authentication configuration.

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 Subscribers over Static Interfaces on page 259
- Creating a Static Subscriber Group on page 266

group-count (Dynamic MLD Interface)

Syntax group-count *number*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **mld interface** *interface-name* **static group** *multicast-group-address*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Configure the number of static groups to be created over the dynamic interface.

Options *number*—Number of static groups.

Default: 1

Range: 1 through 512

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Enabling MLD Static Group Membership

group-increment (Dynamic MLD Interface)

Syntax group-increment *number*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **mld interface** *interface-name* **static group** *multicast-group-address* **source**]

Release Information Statement introduced in Junos OS Release 10.1.

Description Configure the number of times the address should be incremented for each static group created on a dynamic interface. The increment is specified in a format similar to an IPv6 address.

Options *increment*—Number of times the address should be incremented.

Default: ::1

Range: ::1 through ffff:ffff:ffff:ffff:ffff:ffff:ffff:ffff:

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Enabling MLD Static Group Membership

group-limit (Dynamic IGMP Interface)

Syntax group-limit *policy-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **igmp interface** *interface-name*],

Release Information Statement introduced in Junos OS Release 10.4.

Description Configure a limit for the number of multicast groups (or [S,G] channels in IGMPv3) allowed on a dynamic logical interface. After this limit is reached, new reports will be ignored and all related flows are not flooded on the logical interface.

Default By default, there is no limit to the number of multicast groups that can join the interface.

Options ***limit***—group limit value for the interface.

Range: 1 through 32767

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring a Dynamic Profile for Client Access on page 353
- For information about limiting the number of multicast group joins for an IGMP logical interface, see “Limiting the Number of IGMP Multicast Group Joins on Logical Interfaces” in the *Junos OS Multicast Protocols Configuration Guide*

group-limit (Dynamic MLD Interface)

Syntax group-limit *limit*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **mld interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Configure a limit for the number of multicast groups (or [S,G] channels in MLDv2) allowed on a dynamic logical interface. After this limit is reached, new reports will be ignored and all related flows are not flooded on the logical interface.

Default By default, there is no limit to the number of multicast groups that can join the interface.

Options ***limit***—group limit value for the interface.

Range: 1 through 32767

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring a Dynamic Profile for Client Access on page 353
- For information about limiting the number of multicast group joins for an MLD logical interface, see “Number of MLD Multicast Group Joins on Logical Interfaces” in the *Junos OS Multicast Protocols Configuration Guide*

group-policy (Dynamic IGMP Interface)

Syntax group-policy *policy-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **igmp interface** *interface-name*],

Release Information Statement introduced in Junos OS Release 9.2.

Description When this statement is enabled on a router running IGMP version 2 (IGMPv2), after the router receives an IGMP report, compare the group against the specified group policy and performs the action configured in that policy (for example, rejects the report).

When this statement is enabled on a router running IGMP version 3 (IGMPv3), after the router receives an IGMP report, compare the group against the specified group policy and performs the action configured in that policy (for example, rejects the report).

Options ***policy-name***—Name of the group policy.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring a Dynamic Profile for Client Access on page 353
- For information about rejecting unwanted reports for an IGMP interface, see "Filtering Unwanted IGMP Reports at the IGMP Interface Level" in the *Junos OS Multicast Protocols Configuration Guide*

group-policy (Dynamic MLD Interface)

Syntax group-policy *policy-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **mld interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description When this statement is enabled on a router running MLD version 1 (MLDv1), after the router receives an MLD report, the router compares the group against the specified group policy and performs the action configured in that policy (for example, rejects the report).

When this statement is enabled on a router running MLD version 2 (MLDv2), after the router receives an MLD report, the router compares the group against the specified group policy and performs the action configured in that policy (for example, rejects the report).

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Filtering Unwanted MLD Reports at the MLD Interface Level

guaranteed-rate (Dynamic Traffic Shaping)

Syntax guaranteed-rate (*rate* | $junos-cos-guaranteed-rate);

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service traffic-control-profiles** *profile-name*]

Release Information Statement introduced in Junos OS Release 9.2.
The **$junos-cos-guaranteed-rate** variable added in Junos OS Release 9.4.

Description Configure a guaranteed minimum rate for a logical interface.

Default If you do not include this statement and you do not include the **delay-buffer-rate** statement, the logical interface receives a minimal delay-buffer rate and minimal bandwidth equal to 2 MTU-sized packets.

Options ***rate***—Guaranteed rate in bits per second (bps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation **k** (1000), **m** (1,000,000), or **g** (1,000,000,000).

Range: 1000 through 160,000,000,000 bps

$junos-cos-guaranteed-rate—Junos predefined variable that is replaced with the guaranteed rate obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Traffic Scheduling and Shaping for Subscriber Access on page 609
- **output-traffic-control-profile on page 1005**

hardware-address

Syntax hardware-address *mac-address*;

Hierarchy Level [edit access address-assignment pool *pool-name* family (inet | inet6) **host** *hostname*]

Release Information Statement introduced in Junos OS Release 9.0.

Description Specify the MAC address of the client. This is the hardware address that identifies the client on the network.

Options ***mac-address***—The MAC address of the client.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Address-Assignment Pools on page 56

home-agent (Mobile IP Dynamic Assignment)

Syntax

```
home-agent {
  nai (name@domain | @domain) {
    home-agent ip-address;
  }
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* services **mobile-ip dynamic-home-assignment**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip dynamic-home-assignment**],
[edit routing-instances *routing-instances-name* services **mobile-ip dynamic-home-assignment**],
[edit services **mobile-ip dynamic-home-assignment**]

Release Information

Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services mobile-ip dynamic-home-assignment]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip dynamic-home-assignment]**, and **[edit routing-instances *routing-instances-name* services mobile-ip dynamic-home-assignment]** hierarchy levels added in Junos OS Release 9.5.

Description

Configure the IP address to which registration requests are sent as part of the home agent's dynamic assignment rule.

The remaining statements are explained separately.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Mobile IP on page 315
- Configuring Dynamic Home Assignment for the Mobile Node on page 321

home-agent (Mobile IP Network Address Identifier)

Syntax home-agent *ip-address*;

Hierarchy Level
[edit services **mobile-ip dynamic-home-assignment home-agent nai** *name*@*domain*],
[edit logical-systems *logical-system-name* services **mobile-ip dynamic-home-assignment home-agent nai** *name*@*domain*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* services **mobile-ip dynamic-home-assignment home-agent nai** *name*@*domain*],
[edit routing-instances *routing-instance-name* services **mobile-ip dynamic-home-assignment home-agent nai** *name*@*domain*],
[edit services **mobile-ip dynamic-home-assignment home-agent nai** @*domain*],
[edit logical-systems *logical-system-name* services **mobile-ip dynamic-home-assignment home-agent nai** @*domain*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* services **mobile-ip dynamic-home-assignment home-agent nai** @*domain*,
[edit routing-instances *routing-instance-name* services **mobile-ip dynamic-home-assignment home-agent nai** @*domain*]

Release Information Statement introduced in Junos OS Release 9.3.

Description Configure the IP address to which registration requests are sent as part of the home agent's dynamic assignment rule.

Options ***ip-address***—IP address of the home agent

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring Mobile IP on page 315
- Configuring Dynamic Home Assignment for the Mobile Node on page 321

home-agent (Mobile IP Networks)

Syntax

```
home-agent {
  enable-service interface-name;
  virtual-network {
    home-agent-address ip-address {
      registration-lifetime seconds;
      revocation-required;
      timestamp-tolerance seconds;
    }
  }
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* services **mobile-ip**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip**],
[edit routing-instances *routing-instances-name* services **mobile-ip**],
[edit services **mobile-ip**]

Release Information

Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services mobile-ip]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip]**, and **[edit routing-instances *routing-instances-name* services mobile-ip]** hierarchy levels added in Junos OS Release 9.5.

Description

Define the virtual networks and non-virtual networks for the Mobile IP home agent.

The remaining statements are explained separately.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Mobile IP on page 315

home-agent-address

Syntax

```
home-agent-address ip-address {
    registration-lifetime seconds;
    revocation-required;
    timestamp-tolerance seconds;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* services **mobile-ip home-agent virtual-network**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip home-agent virtual-network**],
[edit routing-instances *routing-instances-name* services **mobile-ip home-agent virtual-network**],
[edit services **mobile-ip home-agent virtual-network**]

Release Information

Statement introduced in Junos OS Release 9.3.
Support at the **edit logical-systems *logical-system-name* services mobile-ip home-agent virtual-network]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip home-agent virtual-network]**, and **[edit routing-instances *routing-instances-name* services mobile-ip home-agent virtual-network]** hierarchy levels added in Junos OS Release 9.5.

Description

Defines addressing for the virtual network of the Mobile IP home agent.

Options

ip-address—For virtual networks, the loopback IP address for the virtual network. For non-virtual networks, a public address.

The remaining statements are explained separately.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Mobile IP on page 315
- Configuring the Mobile IP Home Agent on page 319

host (Address-Assignment Pools)

Syntax

```
host hostname {
  hardware-address mac-address;
  ip-address ip-address;
}
```

Hierarchy Level [edit access address-assignment **pool** *pool-name* **family** (inet | inet6)]

Release Information Statement introduced in Junos OS Release 9.0.

Description Configure a static binding for the specified client.

Options ***hostname***—Name of the client.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56

host (Diameter Base Protocol)

Syntax host *hostname*;

Hierarchy Level [edit **diameter origin**]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify the name of the host that originates the Diameter message.

Options ***hostname***—Name of the message origin host. Supplied as the value of Origin-Host AVP for all messages sent by the Diameter master instance.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Diameter on page 233
- Configuring the Origin Attributes of the Diameter Instance on page 234

identification (Tunnel Profile)

Syntax identification *name*;

Hierarchy Level [edit access tunnel-profile *profile-name* **tunnel** *tunnel-id*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the assignment ID of an L2TP tunnel. L2TP sessions with the same tunnel assignment identification and destination are grouped into the same tunnel.

Options ***name***—Tunnel assignment ID; string of up to 32 alphanumeric characters.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring a Tunnel Profile for Subscriber Access on page 219

ieee-802.1 (Dynamic Classifiers)

Syntax ieee-802.1 (*classifier-name* | default) **vlan-tag** (inner | outer);

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* **unit** *logical-unit-number* **classifiers**]

Release Information Statement introduced in Junos OS Release 10.1.

Description Apply an IEEE-802.1 classifier to a subscriber interface in a dynamic profile.

Options ***classifier-name***—Name of a **classifier** mapping configured at the **[edit class-of-service classifier ieee-802.1]** hierarchy level.

default—The default mapping.

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
- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Applying a Classifier to a Subscriber Interface in a Dynamic Profile on page 618
- classifiers (Definition)

ieee-802.1 (Dynamic Rewrite Rules)

Syntax ieee-802.1 (*rewrite-name* | default) **vlan-tag** (outer | outer-and-inner);

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* **unit** *logical-unit-number* **rewrite-rules**]

Release Information Statement introduced in Junos OS Release 10.1.

Description Apply an IEEE-802.1 rewrite rule to a subscriber interface in a dynamic profile.

Options ***rewrite-name***—Name of a **rewrite-rules** mapping configured at the **[edit class-of-service rewrite-rules ieee-802.1]** hierarchy level.

default—The default mapping.

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

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Applying a Rewrite Rule Definition to a Subscriber Interface in a Dynamic Profile on page 617
- rewrite-rules

ietf-mode

Syntax pre-ietf-mode

Hierarchy Level [edit protocols **ancp neighbor**]

Release Information Statement introduced in Junos OS Release 9.5.

Description Configure ANCP to run in a mode that is not backward compatible with Internet draft draft-ietf-ancp-protocol-00.txt, *Protocol for Access Node Control Mechanism in Broadband Networks*. Include this statement when pre-ietf mode has been configured globally for ANCP, but you want one or more neighbors to run ANCP in the default mode.

Default By default, ANCP does not run in a backwards-compatible mode.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring ANCP on page 713
- Configuring ANCP Neighbors on page 717

igmp (Dynamic Profiles)

Syntax

```
igmp {
  interface interface-name {
    accounting;
    disable;
    group-policy;
    immediate-leave
    no-accounting;
    oif-map;
    passive;
    promiscuous-mode;
    ssm-map ssm-map-name;
    static {
      group group {
        source source;
      }
    }
    version version;
  }
}
```

Hierarchy Level

[edit dynamic-profiles *profile-name* protocols],
[edit logical-systems *logical-system-name* protocols],
[edit protocols]

Release Information

Statement introduced in Junos OS Release 9.2.

Description

Enable IGMP on the router. IGMP must be enabled for the router to receive multicast packets.

Default

IGMP is disabled on the router. IGMP is automatically enabled on all broadcast interfaces when you configure Protocol Independent Multicast (PIM) or Distance Vector Multicast Routing Protocol (DVMRP).

Options

The statements are explained separately.

Required Privilege Level

routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring a Dynamic Profile for Client Access on page 353
- For general information about configuring IGMP, see the *Junos OS Multicast Protocols Configuration Guide*
- For information about enabling IGMP, see “Enabling IGMP” in the *Junos OS Multicast Protocols Configuration Guide*

ignore

Syntax

```
ignore {
    framed-ip-netmask;
    input-filter;
    logical-system-routing-instance;
    output-filter;
}
```

Hierarchy Level [edit access profile *profile-name* radius **attributes**]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Configure the router or switch to ignore the specified attributes in RADIUS Access-Accept messages. By default, the router or switch processes the attributes it receives from the external server.

Options

framed-ip-netmask—Framed-IP-Netmask (RADIUS attribute 9).

input-filter—Ingress-Policy-Name (VSA 26-10).

logical-system-routing-instance—Virtual-Router (VSA 26-1).

output-filter—Egress-Policy-Name (VSA 26-11).

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring RADIUS Server Parameters for Subscriber Access on page 26

immediate-leave (Dynamic IGMP Interface)

Syntax immediate-leave;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **igmp interface** *interface-name*],

Release Information Statement introduced in Junos OS Release 9.2.

Description Immediately remove the group membership from the interface and suppresses the sending of any group-specific queries for the multicast group when this statement is enabled on a router running IGMP version 2 (IGMPv2), after the router receives a leave group membership message from a host associated with the interface.

Suppress the sending of group-and-source queries but rely on the Junos-supported host tracking mechanism to determine whether or not it should remove a particular source group membership from the interface when this statement is enabled on a router running IGMP version 3 (IGMPv3), after the router receives a report with the type BLOCK_OLD_SOURCES.

NOTE: When issuing this command on IGMPv2 interfaces, ensure that the IGMP interface has only one IGMP host connected. If more than one IGMPv2 host is connected to a LAN through the same interface, and one host sends a done message, the router removes all hosts on the interface from the multicast group. The router loses contact with the hosts that are supposed to remain in the multicast group until they send join requests in response to the next general multicast listener query from the router.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring a Dynamic Profile for Client Access on page 353
- For information about configuring IGMP immediate leave, see “Specifying Immediate-Leave Host Removal” in the *Junos OS Multicast Protocols Configuration Guide*

immediate-leave (Dynamic MLD Interface)

Syntax immediate-leave;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **mld interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description When this statement is enabled on a router running MLDv1, after the router receives a multicast listener done message from a host associated with the interface, the router immediately removes the group membership from the interface and suppresses the sending of any group-specific queries for the multicast group.

When this statement is enabled on a router running MLDv2, after the router receives a report with the type BLOCK_OLD_SOURCES, the router suppresses the sending of group-and-source queries but relies on the Junos-supported host tracking mechanism to determine whether or not it removes a particular source group membership from the interface.

NOTE: Use this statement only on MLD interfaces to which one MLD host is connected. If more than one MLD host is connected to a LAN through the same interface, and one host sends a done message, the router removes all hosts on the interface from the multicast group. The router loses contact with the hosts that properly remain in the multicast group until they send join requests in response to the router's next general multicast listener query.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Specifying Immediate-Leave Host Removal for MLD

immediate-update

Syntax immediate-update;

Hierarchy Level [edit access profile *profile-name* **accounting**]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Configure the router or switch to send an Acct-Update message to the RADIUS accounting server on receipt of a response (for example, an ACK or timeout) to the Acct-Start message.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring RADIUS Server Parameters for Subscriber Access on page 26
- Configuring Per-Subscriber Session Accounting on page 24

inet-precedence (Dynamic Classifiers)

Syntax inet-precedence (*classifier-name* | default);

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* **classifiers**]

Release Information Statement introduced in Junos OS Release 10.1.

Description Apply a IPv4 precedence classifier to a subscriber interface in a dynamic profile.

Options *classifier-name*—Name of a **classifier** mapping configured at the **[edit class-of-service classifier ieee-802.1]** hierarchy level.

default—The default mapping.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Applying a Classifier to a Subscriber Interface in a Dynamic Profile on page 618
- classifiers (Definition)

inet-precedence (Dynamic Rewrite Rules)

Syntax inet-precedence (*rewrite-name* | default);

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules]

Release Information Statement introduced in Junos OS Release 10.1.

Description Apply a IPv4 precedence rewrite rule.

Options ***rewrite-name***—Name of a **rewrite-rules** mapping configured at the **[edit class-of-service rewrite-rules inet-precedence]** hierarchy level.

default—The default mapping. By default, IP precedence rewrite rules alter the first three bits on the type of service (ToS) byte while leaving the last three bits unchanged.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Applying a Rewrite Rule Definition to a Subscriber Interface in a Dynamic Profile on page 617
- rewrite-rules

inner-tag-protocol-id (Dynamic VLANs)

Syntax inner-tag-protocol-id *tpid*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number***input-vlan-map**]
[edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number***output-vlan-map**]

Release Information Statement introduced in Junos OS Release 10.4.

Description For dynamic VLAN interfaces, configure the IEEE 802.1Q TPID value to rewrite for the inner tag. All TPIDs you include in input and output VLAN maps must be among those you specify at the **[edit interfaces *interface-name* gigether-options ethernet-switch-profile tag-protocol-id *tpids*]** hierarchy level.

Default If the **inner-tag-protocol-id** statement is not configured, the TPID value is 0x8100.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Inner and Outer TPIDs and VLAN IDs

inner-vlan-id (Dynamic VLANs)

Syntax inner-vlan-id *number*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number***input-vlan-map**]
[edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number***output-vlan-map**]

Release Information Statement introduced in Junos OS Release 10.4.

Description For dynamic VLAN interfaces, specify the VLAN ID to rewrite for the inner tag of the final packet.

You cannot include the **inner-vlan-id** statement with the **swap** statement, **swap-push** statement, **push-push** statement, or **push-swap** statement and the **inner-vlan-id** statement at the **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* output-vlan-map]]** hierarchy level. If you include any of those statements in the output VLAN map, the VLAN ID in the outgoing frame is rewritten to the **inner-vlan-id** statement you include at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level.

Options *number*—VLAN ID number.

Range: 0 through 4094

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Inner and Outer TPIDs and VLAN IDs

input (Dynamic Service Sets)

Syntax

```
input {
  service-set service-set-name {
    service-filter filter-name;
  }
  post-service-filter filter-name;
}
```

Hierarchy Level

[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* service],
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos–interface–unit" family *family* service]

Release Information

Statement introduced in Junos OS Release 9.5.
The **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family* service]** hierarchy added in Junos 10.1.

Description

Define the input service sets and filters to be applied to traffic by a dynamic profile. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.

Options

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

- Dynamic Service Sets Overview on page 501
- Associating Service Sets to Interfaces in a Dynamic Profile on page 527

input-vlan-map (Dynamic Interfaces)

Syntax

```
input-vlan-map {
  inner-tag-protocol-id tpid;
  inner-vlan-id number;
  (push | swap);
  tag-protocol-id tpid;
  vlan-id number;
}
```

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 10.4.

Description For dynamic interfaces, define the rewrite profile to be applied to incoming frames on this logical interface.

The 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

- Stacking and Rewriting VLAN Tags for the Layer 2 Wholesale Solution

interface (DHCP Local Server)

Syntax

```
interface interface-name {
    exclude;
    overrides {
        client-discover-match <option60-and-option82>;
        interface-client-limit number;
        no-arp;
    }
    trace;
    upto upto-interface-name;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 group** *group-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server **group** *group-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server **dhcpv6 group** *group-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 group** *group-name*],
[edit system services dhcp-local-server **group** *group-name*],
[edit system services dhcp-local-server **dhcpv6 group** *group-name*]

Release Information

Statement introduced in Junos OS Release 9.0.
upto and **exclude** options introduced in Junos OS Release 9.1.

Description

Specify one or more interfaces, or a range of interfaces, that are within a specified group on which the DHCP local server is enabled. You can repeat the **interface** ***interface-name*** statement to specify multiple interfaces within a group, but you cannot specify the same interface in more than one group. Also, you cannot use an interface that is being used by the DHCP relay agent.

NOTE: DHCP values are supported in Integrated Routing and Bridging (IRB) configurations. When you configure an IRB interface in a network that is using DHCP, the DHCP information (for example, authentication, address assignment, and so on) is propagated in the associated bridge domain. This enables the DHCP server to configure client IP addresses residing within the bridge domain. IRB currently only supports static DHCP configurations. For additional information about how to configure IRB, see the *Junos OS MX Series Ethernet Services Routers Solutions Guide*.

Options

exclude—Exclude an interface or a range of interfaces from the group. This option and the **overrides** option are mutually exclusive.

interface-name—Name of the interface. You can repeat this keyword multiple times.

upto-interface-name—The upper end of the range of interfaces; the lower end of the range is the interface-name entry. The interface device name of the ***upto-interface-name*** must be the same as the device name of the ***interface-name***.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Extended DHCP Local Server Overview on page 84
- Grouping Interfaces with Common DHCP Configurations on page 98
- Using External AAA Authentication Services with DHCP on page 96

interface (DHCP Relay Agent)

Syntax

```
interface interface-name {
  exclude;
  overrides {
    allow-snooped-clients;
    always-write-giaddr;
    always-write-option-82;
    client-discover-match <option60-and-option82>;
    disable-relay;
    interface-client-limit number;
    layer2-unicast-replies;
    no-allow-snooped-clients;
    no-arp;
    proxy-mode;
    replace-ip-source-with;
    send-release-on-delete;
    trust-option-82;
  }
  trace;
  upto upto-interface-name;
}
```

Hierarchy Level

[edit forwarding-options dhcp-relay **group** *group-name*],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **group** *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name*],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name*]

Release Information

Statement introduced in Junos OS Release 8.3.
upto and **exclude** options introduced in Junos OS Release 9.1.

Description

Specify one or more interfaces, or a range of interfaces, that are within a specified group on which the DHCP relay agent is enabled. You can repeat the **interface** ***interface-name*** statement to specify multiple interfaces within a group, but you cannot specify the same interface in more than one group. Also, you cannot use an interface that is being used by the DHCP local server.

NOTE: DHCP values are supported in Integrated Routing and Bridging (IRB) configurations. When you configure an IRB interface in a network that is using DHCP, the DHCP information (for example, authentication, address assignment, and so on) is propagated in the associated bridge domain. This enables the DHCP server to configure client IP addresses residing within the bridge domain. IRB currently only supports static DHCP configurations. For additional information about how to configure IRB, see the *Junos OS MX Series Ethernet Services Routers Solutions Guide*.

Options

exclude—Exclude an interface or a range of interfaces from the group. This option and the **overrides** option are mutually exclusive.

interface-name—The name of the interface. You can repeat this keyword multiple times.

overrides—Override the specified default configuration settings for the interface. The **overrides** statement is described separately.

upto-interface-name—The upper end of the range of interfaces; the lower end of the range is the interface-name entry. The interface device name of the ***upto-interface-name*** must be the same as the device name of the ***interface-name***.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Extended DHCP Relay Agent Overview on page 136
- Grouping Interfaces with Common DHCP Configurations on page 98
- Using External AAA Authentication Services with DHCP on page 96

interface (Dynamic IGMP)

Syntax

```
interface interface-name {
    accounting;
    disable;
    group-policy;
    immediate-leave
    no-accounting;
    oif-map;
    passive;
    promiscuous-mode;
    ssm-map ssm-map-name;
    static {
        group group {
            source source;
        }
    }
    version version;
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* protocols igmp]

Release Information Statement introduced in Junos OS Release 9.2.

Description Enable IGMP on an interface and configure interface-specific properties.

Options ***interface-name***—Variable for the interface. Specify the interface variable ($junos-interface-name) to indicate that the dynamic profile chooses an interface for the accessing DHCP client.

The remaining statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring a Dynamic Profile for Client Access on page 353
- For information about configuring IGMP interfaces, see “Enabling IGMP” in the *Junos OS Multicast Protocols Configuration Guide*

interface (Dynamic Interface Sets)

Syntax

```
interface interface-name {
    unit logical-unit-number;
}
```

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces interface-set** *interface-set-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Add a subscriber interface to a dynamic interface-set.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring an Interface Set of Subscribers in a Dynamic Profile on page 644

interface (Dynamic MLD)

Syntax

```
interface interface-name {
  disable;
  (accounting | no-accounting);
  group-policy;
  immediate-leave;
  oif-map;
  passive;
  ssm-map ssm-map-name;
  static {
    group multicast-group-address {
      exclude;
      group-count number;
      group-increment increment;
      source ip-address {
        source-count number;
        source-increment increment;
      }
    }
  }
  version version;
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* protocols mld]

Release Information Statement introduced in Junos OS Release 10.1.

Description Enable MLD on a dynamic interface and configure interface-specific properties.

Options ***interface-name***—Variable for the interface. Specify the interface variable ($junos-interface-name) to indicate that the dynamic profile chooses an interface for the accessing client.

The remaining statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Enabling MLD

interface (Dynamic Profiles)

Syntax interface *interface-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* routing-instances *routing-instance-name*]
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name*],
[edit routing-instances *routing-instance-name*]

Release Information Statement introduced prior to Junos OS Release 7.4.
[edit dynamic-profiles *profile-name* routing-instances *routing-instance-name*] support added in Junos OS Release 9.6.

Description Assign the specified interface to the current routing instance. When used in the **[edit dynamic-profiles *profile-name* routing-instances *routing-instance-name*]** hierarchy, specify the *$junos-routing-instance* predefined variable.

Options ***interface-name***—Name of the interface.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring Routing Instances

interface (Dynamic Router Advertisement)

Syntax

```
interface interface-name {
  current-hop-limitnumber;
  default-lifetime seconds;
  (managed-configuration | no-managed-configuration);
  max-advertisement-interval seconds;
  min-advertisement-interval seconds;
  (other-stateful-configuration | no-other-stateful-configuration);
  prefixprefix {
    (autonomous | no-autonomous);
    (on-link | no-on-link);
    preferred-lifetime seconds;
    valid-lifetime seconds;
  }
  reachable-time milliseconds;
  retransmit-timer milliseconds;
}
```

Hierarchy Level [edit dynamic-profiles protocols router-advertisement]

Release Information Statement introduced in Junos OS Release 10.1.

Description Dynamically configure router advertisement properties on an interface. To dynamically configure interface properties, include the ***$junos-interface-name*** dynamic variable for the interface name.

Options ***interface-name***—Name of an interface. Specify the ***$junos-interface-name*** dynamic variable or the full, static interface name, including the physical and logical address components.

NOTE: Even though you can specify the static interface name when defining the interface, we recommend using dynamic variable when configuring this statement.

The remaining statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring an Interface to Send Neighbor Discovery Advertisements

interface (Dynamic Routing Options)

Syntax

```
interface interface-names {
    no-qos-adjust;
}
```

Hierarchy Level

[edit dynamic-profiles *profile-name* **routing-options multicast**],
[edit dynamic-profiles *profile-name* routing-instances *routing-instance-name* **routing-options multicast**]

Release Information

Statement introduced in Junos OS Release 9.6.

Description

Define the maximum bandwidth for a dynamic interface on which you want to apply bandwidth management.

Options

interface-name—Names of the physical or logical interface. For details about specifying interfaces, see the *Junos OS Network Interfaces Configuration Guide*.

The remaining statements are explained separately.

Required Privilege Level

routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

interface (Static Subscriber Group)

Syntax interface *interface-name* <exclude> <upto *upto-interface-name*>;

Hierarchy Level [edit logical-systems *logical-system-name* system services static-subscribers **group** *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers **group** *group-name*],
[edit routing-instances *routing-instances-name* system services static-subscribers **group** *group-name*],
[edit system services static-subscribers **group** *group-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify one or more interfaces, or a range of interfaces, that are within a specified group on which static subscribers are created. You can repeat the **interface** ***interface-name*** statement to specify multiple interfaces within a group. You must configure each interface in only one group.

NOTE: The logical system and routing instance in which the static interfaces are configured must match the logical system and routing instance where the group is configured.

Options exclude—(Optional) Exclude an interface or a range of interfaces from the group.

interface-name—Name of the interface on which static subscribers are created. If you do not specify a unit number for the interface, then .0 is assumed. For example, **ge-0/1/0** is interpreted as **ge-0/1/0.0**.

upto-interface-name—(Optional) The upper end of the range of interfaces; the lower end of the range is the *interface-name* entry. The interface device name of *upto-interface-name* must be the same as the device name of *interface-name*.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259
- Creating a Static Subscriber Group on page 266

interface (Static Subscriber Username)

Syntax interface;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* system services static-subscribers authentication **username-include**],
[edit logical-systems *logical-system-name* system services static-subscribers group *group-name* authentication **username-include**],
[edit routing-instances *routing-instances-name* system services static-subscribers authentication **username-include**],
[edit routing-instances *routing-instances-name* system services static-subscribers group *group-name* authentication **username-include**],
[edit system services static-subscribers authentication **username-include**],
[edit system services static-subscribers group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify that a modified version of the interface name is included as part of the username created for all static subscribers or for the static subscribers in a specified group. The group version of the statement takes precedence over the global version. The username is also sent to RADIUS in the Access-Request message. The interface name is modified by replacing the "/" character with the "-" character. For example, ge-0/1/2.50 is converted to ge-0-1-2.50.

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Subscribers over Static Interfaces on page 259
- Configuring the Static Subscriber Global Username on page 265
- Configuring the Static Subscriber Group Username on page 269

interface-client-limit (DHCP Local Server)

Syntax interface-client-limit *number*;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **overrides**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **overrides**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **dhcpv6 overrides**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 **group** *group-name* **overrides**],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **overrides**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **overrides**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 overrides**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **overrides**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **overrides**],
[edit system services dhcp-local-server **overrides**],
[edit system services dhcp-local-server **dhcpv6 overrides**],
[edit system services dhcp-local-server dhcpv6 **group** *group-name* **overrides**]
[edit system services dhcp-local-server dhcpv6 **group** interface *interface-name group-name* **overrides**]
[edit system services dhcp-local-server group *group-name* **overrides**]
[edit system services dhcp-local-server group *group-name* interface *interface-name* **overrides**]

Release Information Statement introduced in Junos OS Release 9.2.

Description Sets the maximum number of DHCP subscribers per interface allowed for a specific group or for all groups. A group specification takes precedence over a global specification for the members of that group.

Default No limit

Options *number*—Maximum number of clients allowed.
Range: 1 through 500,000

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Extended DHCP Local Server Overview on page 84
- Overriding Default DHCP Local Server Configuration Settings on page 101

interface-client-limit (DHCP Relay Agent)

Syntax
interface-client-limit *number*;

Hierarchy Level
[edit forwarding-options dhcp-relay **overrides**],
[edit forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**]
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* interface *interface-name* **overrides**]

Release Information
Statement introduced in Junos OS Release 9.2.

Description
Sets the maximum number of DHCP subscribers per interface allowed for a specific group or for all groups. A group specification takes precedence over a global specification for the members of that group.

Default
No limit

Options
number—Maximum number of clients allowed.
Range: 1 through 500,000

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Extended DHCP Relay Agent Overview on page 136
- Overriding the Default DHCP Relay Configuration Settings on page 150

interface-description-format

Syntax

```
interface-description-format {
  exclude-adapter;
  exclude-sub-interface;
}
```

Hierarchy Level [edit access profile *profile-name* radius **options**]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.
exclude-adapter and **exclude-sub-interface** options added in JUNOS Release 10.4.

Description Specify the information that is excluded from the interface description that the device passes to RADIUS for inclusion in the RADIUS attribute 87 (NAS-Port-Id). By default, the device includes both the subinterface and the adapter in the interface description.

Options

exclude-adapter—Exclude the adapter from the interface description.

exclude-sub-interface—Exclude the subinterface from the interface description.

Required Privilege Level
admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring RADIUS Server Options for Subscriber Access on page 29
- RADIUS Server Options for Subscriber Access on page 27

interface-set (Dynamic CoS)

Syntax

```
interface-set interface-set-name {
  interface interface-name {
    unit logical-unit-number;
  }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces]

Release Information Statement introduced in Junos OS Release 10.4.

Description For MX Series routers with Enhanced Queuing DPCs or Trio MPC/MIC interfaces, configure an interface set for dynamic CoS.

Options

interface-set-name—Name of the scheduler to be configured or the Junos predefined variable ($junos-interface-set-name). The predefined variable is replaced with the interface-set obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.

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

- Configuring an Interface Set of Subscribers in a Dynamic Profile on page 644

interface-traceoptions (DHCP Local Server)

Syntax

```
interface-traceoptions {
  file <filename> <files number> <match regular-expression > <size maximum-file-size>
    <world-readable | no-world-readable>;
  flag flag;
  no-remote-trace;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit system services **dhcp-local-server**]

Release Information

Statement introduced in Junos OS Release 10.4.

Description

Configure extended DHCP local server tracing operations that can be enabled on a specific interface or group of interfaces. You use the **interface** *interface-name* **trace** statement at the **[edit system services group** *group-name***]** hierarchy level to enable the tracing operation on the specific interfaces.

Options

file-name—Name of the file to receive the output of the tracing operation. Enclose the name in quotation marks (“ ”). All files are placed in a file named **jdhcpd** in the directory **/var/log**. If you include the **file** statement, you must specify a filename.

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. If you specify a maximum number of files, you also must specify a maximum file size with the **size** option.

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 include the following flags:

- **all**—Trace all events
- **dhcpv6-packet**—Trace DHCPv6 packet decoding operations.
- **dhcpv6-packet-option**—Trace DHCPv6 option decoding operations.
- **dhcpv6-state**—Trace changes in state for DHCPv6 operations.
- **packet**—Trace packet decoding operations
- **packet-option**—Trace DHCP option decoding operations
- **state**—Trace changes in state

match *regular-expression*—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—Disable remote tracing.

no-world-readable—(Optional) Disable unrestricted file access.

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 also must specify a maximum number of trace files with the **files** option.

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—To view this statement in the configuration.
trace-control—To add this statement to the configuration.

Related Documentation

- Tracing Extended DHCP Operations on page 123
- Tracing Extended DHCP Operations for Specific Interfaces on page 127

interface-traceoptions (DHCP Relay Agent)

Syntax

```
interface-traceoptions {
  file <filename> <files number> <match regular-expression > <size maximum-file-size>
    <world-readable | no-world-readable>;
  flag flag;
  no-remote-trace;
}
```

Hierarchy Level

[edit forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit routing-instances *routing-instance-name* forwarding-options **dhcp-relay**]

Release Information

Statement introduced in Junos OS Release 10.4.

Description

Configure extended DHCP relay agent tracing operations that can be enabled on a specific interface or group of interfaces. You use the **interface *interface-name* trace** statement at the **[edit forwarding-options dhcp-relay group *group-name*]** hierarchy level to enable the tracing operation on the specific interfaces.

Options

file-name—Name of the file to receive the output of the tracing operation. Enclose the name in quotation marks (“ ”). All files are placed in a file named **jdhcpd** in the directory **/var/log**. If you include the **file** statement, you must specify a filename.

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. If you specify a maximum number of files, you also must specify a maximum file size with the **size** option.

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 include the following flags:

- **all**—Trace all events
- **dhcpv6-packet**—Trace DHCPv6 packet decoding operations.
- **dhcpv6-packet-option**—Trace DHCPv6 option decoding operations.
- **dhcpv6-state**—Trace changes in state for DHCPv6 operations.
- **packet**—Trace packet decoding operations
- **packet-option**—Trace DHCP option decoding operations
- **state**—Trace changes in state

match *regular-expression*—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—Disable remote tracing.

no-world-readable—(Optional) Disable unrestricted file access.

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 also must specify a maximum number of trace files with the **files** option.

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—To view this statement in the configuration.
trace-control—To add this statement to the configuration.

Related Documentation
- Tracing Extended DHCP Operations on page 123
- Tracing Extended DHCP Operations for Specific Interfaces on page 127

interfaces (Subscriber Secure Policy)

Syntax interfaces *interface-name*;

Hierarchy Level [edit services **radius-flow-tap**]

Release Information Statement introduced in Junos OS Release 9.4.

Description Specify tunnel interfaces that are used to send mirrored packets to a mediation device.

Options *interface-name*—Name of the interface.

Required Privilege Level
flow-tap—To view this statement in the configuration.
flow-tap-control—To add this statement to the configuration.

Related Documentation
- Subscriber Secure Policy Overview on page 557
- Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 567

interfaces (ANCP)

Syntax

```
interfaces {
  interface-set interface-set-name {
    access-identifier identifier-string <neighbor ip-address>;
  }
  interface-name {
    access-identifier identifier-string <neighbor ip-address>
  }
}
```

Hierarchy Level [edit protocols ancp]

Release Information Statement introduced in Junos OS Release 9.4.

Description Identify the subscribers whose traffic is monitored and shaped by ANCP.

Options *interface-name*—Name of a logical interface supporting a single VLAN that carries traffic to the subscriber identified by the access node identifier.

The remaining statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring ANCP on page 713
- Associating an Access Node with Subscribers for ANCP Operations on page 718

interfaces (Dynamic CoS Definition)

Syntax

```
interfaces {
  interface-name {
    unit logical-unit-number {
      classifiers {
        dscp (classifier-name | default);
        dscp-ipv6 (classifier-name | default);
        ieee-802.1 (classifier-name | default) vlan-tag (inner | outer)
        inet-precedence (classifier-name | default);
      }
      output-traffic-control-profile profile-name;
      rewrite-rules {
        dscp (rewrite-name | default);
        dscp-ipv6 (rewrite-name | default);
        ieee-802.1 (rewrite-name | default) vlan-tag (outer | outer-and-inner);
        inet-precedence (rewrite-name | default);
      }
    }
  }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service]

Release Information Statement introduced in Junos OS Release 9.2.

Description Configure interface-specific CoS properties for incoming packets.

Options ***interface-name***—Either the specific name of the interface you want to assign to the dynamic profile or the interface variable ($junos-interface-ifd-name). The interface variable is dynamically replaced with the interface the DHCP client accesses when connecting to the router.

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

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile on page 617

interfaces (Static and Dynamic Subscribers)

Syntax

```
interfaces {
    interface-name {
        unit logical-unit-number {
            family family {
                address address;
                filter {
                    adf {
                        counter;
                        input-precedence precedence;
                        output-precedence precedence;
                        rule rule-value;
                    }
                    input filter-name (
                        precedence precedence;
                    }
                    output filter-name {
                        precedence precedence;
                    }
                }
                rpf-check {
                    mode loose;
                }
                service {
                    input {
                        service-set service-set-name {
                            service-filter filter-name;
                        }
                        post-service-filter filter-name;
                    }
                    output {
                        service-set service-set-name {
                            service-filter filter-name;
                        }
                    }
                }
                unnumbered-address interface-name preferred-source-address address;
            filter {
                input filter-name;
                output filter-name;
            }
            ppp-options {
                chap;
                pap;
            }
            proxy-arp;
            vlan-id;
            vlan-tags outer [tpid].vlan-id [inner [tpid].vlan-id];
        }
        vlan-tagging;
    }
    interface-set interface-set-name {
        interface interface-name {
```

```
    unit logical-unit-number;
  }
}
demux0 {
  unit logical-unit-number {
    demux-options {
      underlying-interface interface-name
    }
    family family {
      address address;
      demux-source {
        source-prefix;
      }
      filter{
        input filter-name (
          precedence precedence;
        }
        output filter-name {
          precedence precedence;
        }
      }
      mac-validate (loose | strict):
      rpf-check {
        mode loose;
      }
      unnumbered-address interface-name preferred-source-address address;
    }
    filter {
      input filter-name;
      output filter-name;
    }
    vlan-id number;
    vlan-tags outer [tpid].vlan-id [inner [tpid].vlan-id];
  }
}
pp0 {
  unit logical-unit-number {
    keepalives interval seconds;
    no-keepalives;
    pppoe-options {
      underlying-interface interface-name;
      server;
    }
    ppp-options {
      chap;
      pap;
    }
    family inet {
      unnumbered-address interface-name destination address destination-profile
        profile-name;
      address address;
      service {
        input {
          service-set service-set-name {
            service-filter filter-name;
          }
```

```
            post-service-filter filter-name;
        }
        output {
            service-set service-set-name {
                service-filter filter-name;
            }
        }
    }
    filter {
        input filter-name {
            precedence precedence;
        }
        output filter-name {
            precedence precedence;
        }
    }
  }
 }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name*]

Release Information Statement introduced in Junos OS Release 9.2.

Description Define interfaces for dynamic profiles.

Options ***interface-name***—The interface variable (**$junos-interface-ifd-name**). The interface variable is dynamically replaced with the interface the DHCP client accesses when connecting to the router.

NOTE: Though we do not recommend it, you can also enter the specific name of the interface you want to assign to the dynamic profile.

The remaining statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring Static Subscriber Interfaces in Dynamic Profiles on page 397
- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 403
- Relationship Between Subscribers and Interfaces in an Access Network on page 5
- Subscriber Interface Overview on page 391
- Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles on page 467
- For general information about configuring static interfaces, see the *Junos OS Network Interfaces Configuration Guide*
- For information about static IP demux interfaces, see the *Junos OS Network Interfaces Configuration Guide*

interface-set

Syntax

```
interface-set interface-set-name {
    access-identifier identifier-string (neighbor ip-address);
}
```

Hierarchy Level [edit protocols ancp interfaces]

Release Information Statement introduced in Junos OS Release 9.4.

Description Identify a group of VLANs on which traffic is sent to a subscriber identified by the access identifier.

Options ***interface-set-name***—Name of a group of VLANs that carry traffic to the subscriber identified by the access node identifier.

The remaining statement is explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring ANCP on page 713
- Associating an Access Node with Subscribers for ANCP Operations on page 718

interface-specific (Dynamic Firewalls)

Syntax interface-specific;

Hierarchy Level [edit dynamic-profiles *profile-name* firewall family *family* **fast-update-filter** *filter-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure interface-specific names for firewall counters that are based on fast update filters.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring Fast Update Filters on page 513

ip-address

Syntax ip-address *ip-address*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet **host** *hostname*]

Release Information Statement introduced in Junos OS Release 9.0.

Description Specify the reserved IP address assigned to the client.

Options ***ip-address***—The IP version 4 (IPv4) address.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Address-Assignment Pools on page 56
- Configuring Static Address Assignment on page 59

ip-address-first

Syntax ip-address-first;

Hierarchy Level [edit logical-systems *logical-system-name* system services dhcp-local-server **pool-match-order**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **pool-match-order**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **pool-match-order**],
[edit system services dhcp-local-server **pool-match-order**]

Release Information Statement introduced in Junos OS Release 9.0.

Description Configure the extended DHCP local server to use the IP address method to determine which address-assignment pool to use. The local server uses the IP address in the gateway IP address if one is present in the DHCP client PDU. If no gateway IP address is present, the local server uses the IP address of the receiving interface to find the address-assignment pool. The DHCP local server uses this method by default when no method is explicitly specified.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool To Use on page 97
- Extended DHCP Local Server Overview on page 84
- Address-Assignment Pools Overview on page 55

jsrc (JSRC)

Syntax

```
jsrc {
  partition partition-name {
    diameter-instance instance-name;
    destination-host hostname;
    destination-realm realm;
  }
}
```

Hierarchy Level [edit]

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure JSRC to interact with an SAE in an SRC environment to authorize and provision subscribers.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring JSRC on page 251

jsrc-partition

Syntax jsrc-partition *partition-name*;

Hierarchy Level [edit]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify the JSRC partition to use.

Options ***partition-name***—Name of the JSRC partition that you want JSRC to use. The name is defined with the **partition** statement at the **[edit jsrc]** hierarchy level.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring JSRC on page 251
- Configuring the JSRC Partition on page 252

keepalives (Dynamic Profiles)

Syntax

```
keepalives {
    interval seconds;
    }
```

Hierarchy Level

[edit **dynamic-profiles** *profile-name* interfaces *interface-name* **unit** *logical-unit-number*]
[edit **dynamic-profiles** *profile-name* interfaces pp0 **unit** "$junos-interface-unit"]

Release Information

Statement introduced before Junos OS Release 7.4.
The **[edit dynamic-profiles *profile-name*]** hierarchy added in Junos OS Release 9.5.
The **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit"]** hierarchy added in Junos OS Release 10.1.

Description

Specify the keepalive interval in a PPP dynamic profile.

Default

Sending of keepalives is enabled by default. The default keepalive interval is 10 seconds for PPP.

Options

interval *seconds*—The time in seconds between successive keepalive requests.

Range: 1 through 32767 seconds

Default: 10 seconds

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Dynamic Profiles Overview on page 325
- Configuring Dynamic Authentication for PPP Subscribers on page 199

key

Syntax key (hex | ascii) *string*;

Hierarchy Level
[edit logical-systems *logical-system-name* services **mobile-ip peer** ip-address *address* **spi** *hexadecimal-value*],
[edit logical-systems *logical-system-name* services **mobile-ip peer** nai *name*@*domain* **spi** *hexadecimal-value*],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip peer** ip-address *address* **spi** *hexadecimal-value*],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip peer** nai *name*@*domain* **spi** *hexadecimal-value*],
[edit routing-instances *routing-instances-name* services **mobile-ip peer** ip-address *address* **spi** *hexadecimal-value*],
[edit routing-instances *routing-instances-name* services **mobile-ip peer** nai *name*@*domain* **spi** *hexadecimal-value*],
[edit services **mobile-ip peer** ip-address *address* **spi** *hexadecimal-value*],
[edit services **mobile-ip peer** nai *name*@*domain* **spi** *hexadecimal-value*]

Release Information Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services mobile-ip peer ip-address *address* spi *hexadecimal-value*]**, **[edit logical-systems *logical-system-name* services mobile-ip peer nai *name*@*domain* spi *hexadecimal-value*]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip peer ip-address *address* spi *hexadecimal-value*]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip peer nai *name*@*domain* spi *hexadecimal-value*]**, **[edit routing-instances *routing-instances-name* services mobile-ip peer ip-address *address* spi *hexadecimal-value*]**, and **[edit routing-instances *routing-instances-name* services mobile-ip peer nai *name*@*domain* spi *hexadecimal-value*]** hierarchy levels added in Junos OS Release 9.5.

Description Configure the authentication key for the security association, in either HEX or ASCII format. The resulting 128–bit key is specified as a hexadecimal number with each character in the range 0x0–0xF.

Options **hex *string***—Key specified in HEX format

ascii *string*—Key specified in ASCII format

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Mobile IP on page 315
- Configuring the Mobile IP Home Agent on page 319

layer2-unicast-replies

Syntax layer2-unicast-replies;

Hierarchy Level
[edit forwarding-options dhcp-relay **overrides**],
[edit forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**]
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* interface *interface-name* **overrides**]

Release Information Statement introduced in Junos OS Release 8.3.

Description Override the setting of the broadcast bit in DHCP request packets and instead use the Layer 2 unicast transmission method to transmit DHCP Offer reply packets and DHCP ACK reply packets from the DHCP server to DHCP clients during the discovery process.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Extended DHCP Relay Agent Overview on page 136

link (Address-Assignment Pools)

Syntax link *pool-name*;

Hierarchy Level [edit access address-assignment **pool** *pool-name*]

Release Information Statement introduced in Junos OS Release 10.2.

Description Configure the name of the secondary address-assignment pool that is linked to a primary address-assignment pool. The secondary pool provides backup pool for local address assignment.

Options ***pool-name***—Name assigned to the address-assignment pool.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56
- Configuring Address-Assignment Pool Linking on page 58

local-server-group

Syntax local-server-group *local-server-group-name*;

Hierarchy Level
[edit forwarding-options dhcp-relay relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit forwarding-options dhcp-relay group *group-name* relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)]

Release Information Statement introduced in Junos OS Release 9.0.

Description Forward DHCP client packets to a specific extended DHCP local server when you use the DHCP vendor class identifier option (option 60) in DHCP packets to forward client traffic to specific DHCP servers.

If the option 60 string received in the DHCP client packet matches the ASCII or hexadecimal match string and match criteria (exact match or partial match) that you specify, the extended DHCP relay agent forwards the client packets to the specified extended DHCP local server group configured with the **dhcp-local-server** statement at the **[edit system services]** hierarchy level.

Options ***local-server-group-name***—Name of the extended DHCP local server group.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 169

logical-system

Syntax logical-system *logical-system-name* <routing-instance *routing-instance-name* > ;

Hierarchy Level [edit **diameter peer** *peer-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specifies a logical system and optionally a routing instance for a Diameter peer. Alternatively, you can include the **routing-instance** statement at the **[edit diameter peer *peer-name*]** hierarchy level to configure only a routing instance.

Options ***logical-system-name***—(Optional) Name of the logical system.
Default: By default, the default logical system is used.

routing-instance *routing-instance-name*—(Optional) Name of the routing instance.
Default: By default, the master routing instance is used.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Diameter on page 233
- Configuring Diameter Peers on page 234

logical-system (Tunnel Profile)

Syntax logical-system *logical-system-name*;

Hierarchy Level [edit access tunnel-profile *profile-name* **tunnel** *tunnel-id*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify a logical system for a tunnel. When you specify a logical system, you must also specify a routing instance.

Options ***logical-system-name***—(Optional) Name of the logical system.
Default: By default, the logical system *default* is used.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring a Tunnel Profile for Subscriber Access on page 219

logical-system-name (DHCP Local Server)

Syntax logical-system-name;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit system services **dhcp-local-server authentication username-include**],
[edit system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit system services dhcp-local-server **group** *group-name* **authentication username-include**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify that the logical system name be concatenated with the username during the subscriber authentication process. No logical system name is concatenated if the configuration is in the default logical system.

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

logical-system-name (DHCP Relay Agent)

Syntax logical-system-name;

Hierarchy Level
[edit forwarding-options dhcp-relay authentication **username-include**],
[edit forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify that the logical system name is concatenated with the username during the subscriber authentication process. No logical system name is concatenated if the configuration is in the default logical system.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

logical-system-name (Static Subscribers)

Syntax logical-system-name;

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* system services static-subscribers authentication **username-include**],
[edit logical-systems *logical-system-name* system services static-subscribers group *group-name* authentication **username-include**],
[edit routing-instances *routing-instances-name* system services static-subscribers authentication **username-include**],
[edit routing-instances *routing-instances-name* system services static-subscribers group *group-name* authentication **username-include**],
[edit system services static-subscribers authentication **username-include**],
[edit system services static-subscribers group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify that the name of the logical system is included as part of the username created for all static subscribers or for the static subscribers in a specified group. The group version of the statement takes precedence over the global version. The username is also sent to RADIUS in the Access-Request message.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259
- Configuring the Static Subscriber Global Username on page 265
- Configuring the Static Subscriber Group Username on page 269

loss-priority (Dynamic Schedulers)

Syntax loss-priority (any | low | medium-low | medium-high | high);

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service schedulers** *scheduler-name* **drop-profile-map**]

Release Information Statement introduced in Junos OS Release 9.3.

Description Specify a loss priority to which to apply a drop profile in a dynamic profile. The drop profile map sets the drop profile for a specific PLP and protocol type. The inputs for the map are the PLP designation and the protocol type. The output is the drop profile.

Options

any—The drop profile applies to packets with any PLP.

high—The drop profile applies to packets with high PLP.

medium—The drop profile applies to packets with medium PLP.

low—The drop profile applies to packets with low PLP.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 611

mac-address (DHCP Local Server)

Syntax mac-address;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit system services **dhcp-local-server authentication username-include**],
[edit system services dhcp-local-server **group** *group-name* **authentication username-include**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify that the MAC address from the client PDU be concatenated with the username during the subscriber authentication process.

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

mac-address (DHCP Relay Agent)

Syntax mac-address;

Hierarchy Level
[edit forwarding-options dhcp-relay authentication **username-include**],
[edit forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify that the MAC address from the client PDU be concatenated with the username during the subscriber authentication process.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

mac-address (Dynamic Access-Internal Routes)

Syntax mac-address *address*;

Hierarchy Level [edit dynamic-profiles routing-options **access-internal route** *subscriber-ip-address* **qualified-next-hop** *underlying-interface*]

Release Information Statement introduced in Junos OS Release 9.5.

Description Dynamically configure the MAC address variable for an access-internal route for unnumbered interfaces such as DHCP subscriber interfaces.

Options *address*—Either the specific MAC address you want to assign to the access-internal route or the MAC address variable ($junos-subscriber-mac-address). The MAC address variable is dynamically replaced with the value supplied by DHCP when a subscriber logs in.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 187

mac-validate (Dynamic IP Demux Interface)

Syntax mac-validate (loose | strict);

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces demux0 unit** *logical-unit-number* **family** *family*]

Release Information Statement introduced in Junos OS Release 9.3.

Description Enable IP and MAC address validation for dynamic IP demux interfaces in a dynamic profile. Supported on MX Series routers only.

Options

loose—Forwards incoming packets when both the IP source address and the MAC source address match one of the trusted address tuples. Drops packets when the IP source address matches one of the trusted tuples, but the MAC address does not match the MAC address of the tuple. Continues to forward incoming packets when the source address of the incoming packet does not match any of the trusted IP addresses.

strict—Forwards incoming packets when both the IP source address and the MAC source address match one of the trusted address tuples. Drops packets when the MAC address does not match the tuple's MAC source address, or when IP source address of the incoming packet does not match any of the trusted IP addresses.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring MAC Address Validation for Subscriber Interfaces on page 405

managed-configuration (Dynamic Router Advertisement)

Syntax (managed-configuration | no-managed-configuration);

Hierarchy Level [edit dynamic-profiles protocols router-advertisement interface *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Specify whether to enable the dynamic host to use a stateful autoconfiguration protocol for address autoconfiguration, along with any stateless autoconfiguration already configured:

- **managed-configuration**—Enable host to use stateful autoconfiguration.
- **no-managed-configuration**—Disable host from using stateful autoconfiguration.

Default The configured object is disabled unless explicitly enabled.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Enabling Stateful Autoconfiguration with Neighbor Discovery

mandatory

Syntax mandatory;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **variables** *variable-name*]

Release Information Statement introduced in Junos OS Release 9.3.

Description Configure RADIUS to return a value for a user-defined variable. If RADIUS does not return a value for the variable, the dynamic profile fails.

When a dynamic profile has mandatory and non-mandatory variables, configure mandatory variables first in the profile.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring User-Defined CoS Variables in a Dynamic Service Profile on page 630

map (Domain Maps)

Syntax

```
map domain-map-name {
  aaa-logical-system logical-system-name {
    aaa-routing-instance routing-instance-name;
  }
  aaa-routing-instance routing-instance-name;
  access-profile profile-name;
  address-pool pool-name;
  dynamic-profile profile-name;
  padn destination-address {
    mask destination-mask;
    metric route-metric;
  }
  strip-domain;
  target-logical-system logical-system-name {
    target-routing-instance routing-instance-name;
  }
  target-routing-instance routing-instance-name;
  tunnel-profile profile-name;
}
```

Hierarchy Level [edit access domain]

Release Information Statement introduced in Junos OS Release 10.4.

Description Domain map that is used to map options and parameters to subscriber sessions based on the subscriber domain.

Options *domain-map-name*—Name of the domain map. The name is the same as the subscriber domain to which it will apply. For example, for the username **user1@xyz.com**, the domain map name is **xyz.com**.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Domain Maps on page 66

match-direction

Syntax match-direction (input | output | input-output);

Hierarchy Level [edit services captive-portal-content-delivery rule *rule-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the direction in which the rule match is applied.

Options **input**—Apply the rule match on the input side of the interface.

output—Apply the rule match on the output side of the interface.

input-output—Apply the rule match bidirectionally.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Redirecting HTTP Requests on page 545

mask (Domain Maps)

Syntax mask *destination-mask*;

Hierarchy Level [edit access domain map *domain-map-name* padn *destination-address*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Configure the IP mask of the destination used in the PADN parameters for a domain map.

Options ***destination-mask***—Subnet mask of the destination.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring PADN Parameters for a Domain Map on page 74

match-order (Dynamic Firewalls)

Syntax match-order [*match-order*];

Hierarchy Level [edit **dynamic-profiles** ***profile-name*** **firewall** family *family* **fast-update-filter** *filter-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify the match conditions and the order in which the conditions are examined. Enclose a string of multiple conditions in brackets. The router examines only the conditions you specify, and examines them in the specified order.

Options ***match-order***—One or more of the following conditions. "Fast Update Filter Match Conditions" on page 516 describes the match conditions.

- destination-address
- destination-port
- dscp (IPv4 only)
- protocol (IPv4 only)
- source-address
- source-port

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Fast Update Filters on page 513
- Configuring the Match Order for Fast Update Filters on page 514
- Fast Update Filter Match Conditions on page 516

max-advertisement-interval (Dynamic Router Advertisement)

Syntax max-advertisement-interval *seconds*;

Hierarchy Level [edit dynamic-profiles protocols router-advertisement interface *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Maximum interval between each router advertisement message.

Options ***seconds***—Maximum interval.
Range: 4 through 1800 seconds
Default: 600 seconds

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- min-advertisement-interval
- Configuring the Frequency of Neighbor Discovery Advertisements

maximum-discovery-table-entries

Syntax maximum-discovery-table-entries *entry-number*;

Hierarchy Level [edit protocols **ancp**],
[edit protocols **ancp neighbor**]

Release Information Statement introduced in Junos OS Release 9.5.

Description Specify the maximum number of discovery table entries accepted from a particular neighbor. The neighbor can continue to update previously created entries when the maximum has been exceeded, but no new entries are accepted.

Default By default, no limit on the number of table entries is configured.

Options ***entry-number***—Maximum number of discovery table entries.
Range: 1 through 100,000

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring ANCP on page 713
- Configuring ANCP Neighbors on page 717

maximum-helper-restart-time

Syntax maximum-helper-restart-time *seconds*

Hierarchy Level [edit protocols ancp]

Release Information Statement introduced in Junos OS Release 9.4.

Description Specify how long other router processes wait for ANCP to restart before considering it to be down.

Options ***seconds***—Number of seconds other processes wait for ANCP to restart.
Range: 45 through 600 seconds
Default: 45 seconds

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring ANCP on page 713
- Specifying How Long Processes Wait for ANCP Restart to Complete on page 720

maximum-lease-time

Syntax maximum-lease-time *seconds*;

Hierarchy Level [edit access address-assignment pool *pool-name* family (inet | inet6) dhcp-attributes]

Release Information Statement introduced in Junos OS Release 9.0.

Description Specify the maximum length of time, in seconds, that the lease is held for a client if the client does not renew the lease. This is equivalent to DHCP option 51.

Options ***seconds***—The maximum number of seconds the lease can be held.
Range: 30 through 4,294,967,295 seconds
Default: 86,400 (24 hours)

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Address-Assignment Pools on page 56

max-sessions (Dynamic PPPoE)

Syntax max-sessions *number*;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* **pppoe-underlying-options**],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* **pppoe-underlying-options**]

Release Information Statement introduced in Junos OS Release 10.1.

Description Configure the maximum number of dynamic PPPoE logical interfaces that the router can activate on the underlying interface. The **max-sessions** value does not affect the maximum number of static PPPoE logical interfaces that can be configured on the underlying interface.

Options *number*—Maximum number of dynamic PPPoE logical interfaces (sessions) that the router can activate on the underlying interface. The default value is equal to the maximum number of PPPoE sessions supported on your routing platform. You can configure from 1 to the platform-specific default for your routing platform. Changing the **max-sessions** value has no effect on dynamic PPPoE logical interfaces that are already active.

Range:

For Intelligent Queuing 2 (IQ2) PICs on M120 and M320 Series routers, 1 through 4000.

For Trio MPC/MIC interfaces on MX Series routers, 1 through 32000.

Default:

For Intelligent Queuing 2 (IQ2) PICs on M120 and M320 Series routers, 4000.

For Trio MPC/MIC interfaces on MX Series routers, 32000.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces on page 473
- For information about creating static PPPoE interfaces, see the *Junos OS Network Interfaces Configuration Guide*

max-sessions (PPPoE Service Name Tables)

Syntax max-sessions *number*;

Hierarchy Level [edit protocols pppoe service-name-tables *table-name* service *service-name*],

Release Information Statement introduced in Junos OS Release 10.2.

Description Configure the maximum number of active PPPoE sessions using either static or dynamic PPPoE interfaces that the router can establish with the specified named service, **empty** service, or **any** service entry in a PPPoE service name table. The router maintains a count of active PPPoE sessions for each service entry to determine when the maximum sessions limit has been reached.

The router uses the **max-sessions** value for a PPPoE service name table entry in conjunction with the **max-sessions** value configured for the PPPoE underlying interface, and with the maximum number of PPPoE sessions supported on your router. If your configuration exceeds any of these maximum session limits, the router is unable to establish the PPPoE session.

Options *number*—Maximum number of active PPPoE sessions that the router can establish with the specified PPPoE service name table entry, in the range 1 to the platform-specific maximum PPPoE sessions supported for your router. The default value is equal to the maximum number of PPPoE sessions supported on your routing platform.

Range: Specify the range according to the PIC type and router.

For Intelligent Queuing 2 (IQ2) PICs on M120 and M320 Series routers, 1 through 16000.

For Trio MPC/MIC interfaces on MX Series routers, 1 through 64000.

Default: The default value is determined by the PIC type and router.

For Intelligent Queuing 2 (IQ2) PICs on M120 and M320 Series routers, 16000.

For Trio MPC/MIC interfaces on MX Series routers, 64000.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring PPPoE Service Name Tables
- Limiting the Number of Active PPPoE Sessions Established with a Specified Service Name
- **max-sessions (Dynamic PPPoE) on page 969**

max-sessions (Tunnel Profile)

Syntax max-sessions *number*;

Hierarchy Level [edit access tunnel-profile *profile-name* **tunnel** *tunnel-id*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the maximum number of sessions allowed in the tunnel.

Default The default value is zero.

Options ***number***—Maximum number of sessions allowed in the tunnel.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring a Tunnel Profile for Subscriber Access on page 219

medium (Tunnel Profile)

Syntax medium *type*;

Hierarchy Level [edit access tunnel-profile *profile-name* **tunnel** *tunnel-id*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the medium type for the tunnel.

Default The default medium type is **ipv4**.

Options ***type***—Medium type for the tunnel. The only value currently available is **ipv4**.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring a Tunnel Profile for Subscriber Access on page 219

metric (Dynamic Access-Internal Routes)

Syntax metric *route-cost*;

Hierarchy Level [edit dynamic-profiles routing-options **access route** *prefix*]

Release Information Statement introduced in Junos OS Release 9.5.

Description Dynamically configure the cost for an access route.

Options *route-cost*—Either the specific cost you want to assign to the access route or the cost variable ($junos-framed-route-cost). The cost variable is dynamically replaced with the value in Framed-Route Attribute [22].

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring Dynamic Access Routes for Subscriber Management on page 186

metric (Diameter Base Protocol)

Syntax metric *route-metric*;

Hierarchy Level [edit **diameter network-element** *element-name* **forwarding route** *dne-route-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify the metric associated with a destination and function. Together, these three elements define a route reachable through a Diameter network element. A lower metric makes a route more preferred.

Options ***route-metric***—Metric assigned to the route.
Range: 0 through 255

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Diameter on page 233
- Configuring Diameter Network Elements on page 235

metric (Domain Maps)

Syntax metric *route-metric*;

Hierarchy Level [edit access domain **map** *domain-map-name* **padn** *destination-address*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Configure the route metric PADN parameter for a domain map.

Options ***route-metric***—Value assigned to the route.
Range: 0 through 255

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring PADN Parameters for a Domain Map on page 74

min-advertisement-interval (Dynamic Router Advertisement)

Syntax min-advertisement-interval *seconds*;

Hierarchy Level [edit dynamic-profiles protocols router-advertisement interface *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Minimum interval between each router advertisement message.

Options ***seconds***—Minimum interval.
Range: 3 seconds through three-quarter times the maximum advertisement interval value
Default: One-third the maximum advertisement interval value

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- max-advertisement-interval
- Configuring the Frequency of Neighbor Discovery Advertisements

mld (Dynamic Profiles)

Syntax

```
mld {
  interface interface-name {
    disable;
    (accounting | no-accounting);
    group-policy;
    immediate-leave;
    oif-map;
    passive;
    ssm-map ssm-map-name;
    static {
      group multicast-group-address {
        exclude;
        group-count number;
        group-increment increment;
        source ip-address {
          source-count number;
          source-increment increment;
        }
      }
    }
    version version;
  }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* protocols]

Release Information Statement introduced in Junos OS Release 10.1.

Description Configure interface-specific MLD values on dynamic interfaces.

Options The statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Enabling MLD

mobile-ip

Syntax

```
mobile-ip {
  access-type {
    (generic | wimax);
  }
  authenticate {
    order (aaa | local);
  }
  dynamic-home-assignment {
    home-agent {
      nai (name@domain | @domain) {
        home-agent ip-address;
      }
    }
  }
  home-agent {
    enable-service interface-name;
    virtual-network {
      home-agent-address ip-address {
        registration-lifetime seconds;
        revocation-required;
        timestamp-tolerance seconds;
      }
    }
  }
  peer {
    (ip-address address | nai name@domain) {
      spi hexadecimal-value {
        algorithm (hmac-md5 | md5);
        entity-type (host | mobility-agent);
        key (hex | ascii) string;
        replay-method (none | timestamp seconds);
      }
    }
  }
  traceoptions {
    file <filename> <files number> <match regular-expression > <size maximum-file-size>
      <world-readable | no-world-readable>;
    flag flag;
    level (all | error | info | notice | verbose | warning);
    no-remote-trace;
  }
}
```

Hierarchy Level

[edit services],
[edit logical-systems *logical-system-name* services],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services],
[edit routing-instances *routing-instances-name* services]

Release Information

Statement introduced in Junos OS Release 9.3.
access-type statement added in Junos OS Release 9.5.

Support at the **[edit logical-systems *logical-system-name* services]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services]**, and **[edit routing-instances *routing-instances-name* services]**, hierarchy levels added in Junos OS Release 9.5.

Description Configure Junos Mobile IP features.

The remaining statements are explained separately.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring the Mobile IP Home Agent on page 319

mode

Syntax mode loose;

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family (inet) **rpf-check**],

Release Information Statement introduced in Junos OS Release 9.6.

Description Check whether the packet has a source address with a corresponding prefix in the routing table. If a corresponding prefix is not found, unicast reverse path forwarding (RPF) loose mode does not accept the packet. Unlike strict mode, loose mode does not check whether the interface expects to receive a packet with a specific source address prefix.

Default If you do not include this statement, unicast RPF is in strict mode.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring Unicast RPF

multicast (Dynamic Routing Options)

Syntax

```
multicast {
  interface interface-name {
    no-qos-adjust;
  }
}
```

Hierarchy Level

[edit dynamic-profiles *profile-name* routing-options],
[edit dynamic-profiles *profile-name* routing-instances *routing-instance-name* routing-options]

NOTE: You cannot apply a scope policy to a specific routing instance. That is, all scoping policies are applied to all routing instances. However, the scope statement does apply individually to a specific routing instance.

Release Information

Statement introduced in Junos OS Release 9.6.

Description

Dynamically configure interface-specific multicast routing options properties.

The remaining statements are explained separately.

Required Privilege Level

routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring General Multicast Forwarding Cache Properties
- Configuring Multicast Forwarding Cache Properties for Flow Maps
- Configuring Source-Specific Multicast Groups

nai

Syntax

```
nai (name@domain | @domain) {
    home-agent ip-address;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* services **mobile-ip dynamic-home-assignment home-agent**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip dynamic-home-assignment home-agent**],
[edit routing-instances *routing-instances-name* services **mobile-ip dynamic-home-assignment home-agent**],
[edit services **mobile-ip dynamic-home-assignment home-agent**]

Release Information

Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services mobile-ip dynamic-home-assignment home-agent]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip dynamic-home-assignment home-agent]**, and **[edit routing-instances *routing-instances-name* services mobile-ip dynamic-home-assignment home-agent]** hierarchy levels added in Junos OS Release 9.5.

Description

Configure the network address identifiers (NAI) to which registration requests are sent as part of the home agent's dynamic assignment rule .

Options

name*@*domain—User at a specified domain

@***domain***—All users at a specified domain

NOTE: The *name* can include only alphanumeric characters, dots, hyphens, or underscores. The *name* cannot end in @; @ must be used to separate *name* and *domain*. The *domain* can include only alphanumeric characters, dots, or hyphens The *domain* must be in the format *domain.suffix*, where the *suffix* is com, org, net, and so on. The *suffix* must consist of at least two alphanumeric characters.

The remaining statement is explained separately.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Mobile IP on page 315
- Configuring Dynamic Home Assignment for the Mobile Node on page 321

name-server

Syntax name-server [*server-names*];

Hierarchy Level [edit access address-assignment pool *pool-name* family inet **dhcp-attributes**]

Release Information Statement introduced in Junos OS Release 9.0.

Description Configure one or more Domain Name System (DNS) name servers available to the client to resolve hostname-to-client mappings. This is equivalent to DHCP option 6.

Options ***server-names***—IP addresses of the domain name servers, listed in order of preference.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Address-Assignment Pools on page 56

nas-identifier

Syntax nas-identifier *identifier-value*;

Hierarchy Level [edit access profile *profile-name* radius **options**]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Configure the value for the client RADIUS attribute 32 (NAS-Identifier). This attribute is used for authentication and accounting requests.

Options ***identifier-value***—String to use for authentication and accounting requests.

Range: 1 to 64 characters

Required Privilege Level admin—To view this statement in the configuration.
admin–control—To add this statement to the configuration.

Related Documentation
- Configuring RADIUS Server Options for Subscriber Access on page 29
- Configuring RADIUS Server Parameters for Subscriber Access on page 26

nas-port-extended-format

Syntax

```
nas-port-extended-format {
  adapter-width width;
  port-width width;
  slot-width width;
  stacked-vlan-width width;
  vlan-width width;
}
```

Hierarchy Level [edit access profile *profile-name* radius **options**]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Configure the RADIUS client to use the extended format for RADIUS attribute 5 (NAS-Port) and specify the width of the fields in the NAS-Port attribute.

Options

adapter-width *width*—Number of bits in the adapter field.

port-width *width*—Number of bits in the port field.

slot-width *width*—Number of bits in the slot field.

stacked-vlan-width *width*—Number of bits in the SVLAN ID field.

vlan-width *width*—Number of bits in the VLAN ID field.

NOTE: The total of the widths must not exceed 32 bits, or the configuration will fail.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring RADIUS Server Options for Subscriber Access on page 29
- Configuring RADIUS Server Parameters for Subscriber Access on page 26

neighbor (Associate with Access Identifier)

Syntax neighbor *ip-address*;

Hierarchy Level [edit protocols **ancp interfaces interface-set** *interface-set-name* **access-identifier** *identifier-string*],
[edit protocols **ancp interfaces** *interface-name* **access-identifier** *identifier-string*]

Release Information Statement introduced in Junos OS Release 9.5.

Description Configure an ANCP neighbor to be monitored.

Options ***ip-address***—IP address of the ANCP neighbor.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring ANCP on page 713
- Associating an Access Node with Subscribers for ANCP Operations on page 718

neighbor (Define)

Syntax
```
neighbor ip-address {
  adjacency-timer;
  ietf-mode;
  maximum-discovery-table-entries;
  pre-ietf-mode;
}
```

Hierarchy Level [edit protocols **ancp**]

Release Information Statement introduced in Junos OS Release 9.4.

Description Configure an ANCP neighbor to be monitored.

Options ***ip-address***—IP address of the ANCP neighbor.

The remaining statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring ANCP on page 713
- Configuring ANCP Neighbors on page 717

neighbor-discovery-router-advertisement (Address-Assignment Pools)

Syntax neighbor-discovery-router-advertisement *ndra-pool-name*;

Hierarchy Level [edit access **address-assignment**]

Release Information Statement introduced in Junos OS Release 10.1.

Description Configure the name of the address-assignment pool used to assign the router advertisement prefix.

Options ***ndra-pool-name***—Name of the address-assignment pool.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Address-Assignment Pools Overview on page 55
- Configuring an Address-Assignment Pool for Router Advertisement

netbios-node-type

Syntax netbios-node-type *node-type*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet **dhcp-attributes**]

Release Information Statement introduced in Junos OS Release 9.0.

Description Specify the NetBIOS node type. This is equivalent to DHCP option 46.

Options ***node-type***—One of the following node types:

- **b-node**—Broadcast node
- **h-node**—Hybrid node
- **m-node**—Mixed node
- **p-node**—Peer-to-peer node

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Address-Assignment Pools on page 56

network

Syntax network *ip-prefix</prefix-length>*;

Hierarchy Level [edit access address-assignment **pool** *pool-name* **family** inet]

Release Information Statement introduced in Junos OS Release 9.0.

Description Configure subnet information for an IPv4 address-assignment pool.

Options
- ***ip-prefix***—IP version 4 address or prefix value.
- ***prefix-length***—(Optional) Subnet mask.

Required Privilege Level
admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Address-Assignment Pools on page 56

network-element

Syntax

```
network-element element-name {
  forwarding {
    route dne-route-name {
      destination realm realm-name <host hostname> ;
      function function-name <partition partition-name>;
      metric route-metric;
    }
  }
  function function-name;
  peer peer-name {
    priority priority-number;
  }
}
```

Hierarchy Level [edit diameter]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify the transport layer Diameter configuration. The Diameter network element includes a list of routes reachable through the Diameter instance, associated functions, and prioritized Diameter peers.

Options ***element-name***—Name of the network element.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Diameter on page 233
- Configuring Diameter Network Elements on page 235

next-hop (Dynamic Access-Internal Routes)

Syntax next-hop *next-hop*;

Hierarchy Level [edit dynamic-profiles routing-options **access route** *prefix*]

Release Information Statement introduced in Junos OS Release 9.5.

Description Dynamically configure the next-hop address for an access route. Access routes are typically unnumbered interfaces.

Options *next-hop*—Either the specific next-hop address you want to assign to the access route or one of the following next-hop address predefined variables.

- For IPv4 access routes, use the variable, **$junos-framed-route-nexthop**. The route prefix variable is dynamically replaced with the value in Framed-Route RADIUS attribute [22].
- For IPv6 access routes, use the variable, **$junos-framed-route-ipv6-nexthop**. The variable is dynamically replaced with the value in Framed-IPv6-Route RADIUS attribute [99].

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring Dynamic Access Routes for Subscriber Management on page 186

no-accounting

Syntax no-accounting;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **igmp interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 9.2.

Description Disable the collection of IGMP join and leave event statistics on a per-interface basis.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring a Dynamic Profile for Client Access on page 353
- For information about disabling IGMP accounting on and interface, see “Enabling or Disabling IGMP Accounting on Individual Interfaces” in the *Junos OS Multicast Protocols Configuration Guide*

no-allow-snooped-clients

Syntax no-allow-snooped-clients;

Hierarchy Level
[edit forwarding-options dhcp-relay **overrides**],
[edit forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**]
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* interface *interface-name* **overrides**]

Release Information Statement introduced in Junos OS Release 10.2.

Description Explicitly disable DHCP snooping support on the router.

NOTE: In Junos OS Releases 10.0 and earlier, DHCP snooping is *enabled* by default. In releases 10.1 and later, DHCP snooping 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

- Extended DHCP Relay Agent Overview on page 136
- Overriding the Default DHCP Relay Configuration Settings on page 150
- Managing DHCP Snooping Support on page 156

no-arp (DHCP Local Server)

Syntax no-arp;

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **overrides**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **overrides**],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **overrides**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **overrides**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **overrides**],
[edit system services dhcp-local-server **overrides**],
[edit system services dhcp-local-server group *group-name* **overrides**]
[edit system services dhcp-local-server group *group-name* interface *interface-name* **overrides**]

Release Information Statement introduced in Junos OS Release 9.3.

Description Turn off ARP table population in a distrusted environment.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

no-arp (DHCP Relay Agent)

Syntax no-arp;

Hierarchy Level
[edit forwarding-options dhcp-relay **overrides**],
[edit forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**]
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* interface *interface-name* **overrides**]

Release Information Statement introduced in Junos OS Release 9.3.

Description Turn off ARP table population in a distrusted environment.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Extended DHCP Relay Agent Overview on page 136
- Overriding the Default DHCP Relay Configuration Settings on page 150

no-bind-on-request (DHCP Relay Agent)

Syntax no-bind-on-request;

Hierarchy Level
[edit forwarding-options dhcp-relay **overrides**],
[edit forwarding-options dhcp-relay group *group-name* **overrides**],
[edit forwarding-options dhcp-relay group *group-name* interface *interface-name* **overrides**,
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* interface *interface-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* interface *interface-name* **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* interface *interface-name* **overrides**]

Release Information Statement introduced in Junos OS Release 10.4.

Description Explicitly disable automatic binding of received DHCP request messages that have no entry in the database (*stray* requests).

NOTE: Beginning with Junos OS Release 10.4, automatic binding of stray requests is enabled by default. In Junos OS Release 10.3 and earlier releases, automatic binding of stray requests 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

- Extended DHCP Relay Agent Overview on page 136
- Overriding the Default DHCP Relay Configuration Settings on page 150
- Disabling Automatic Binding of Stray DHCP Requests on page 167

no-keepalives (Dynamic Profiles)

Syntax no-keepalives;

Hierarchy Level [edit **dynamic-profiles** *profile-name* interfaces *interface-name* **unit** *logical-unit-number*]
[edit **dynamic-profiles** *profile-name* interfaces pp0 **unit** “$junos-interface-unit”]

Release Information Statement introduced before Junos OS Release 7.4.
The **[edit dynamic-profiles *profile-name*]** hierarchy added in Junos OS Release 9.5.
The **[edit dynamic-profiles *profile-name* interfaces pp0 unit “$junos-interface-unit”]** hierarchy added in Junos OS Release 10.1.

Description Disable the sending of keepalives.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Dynamic Profiles Overview on page 325
- Configuring Dynamic Authentication for PPP Subscribers on page 199

no-qos-adjust (Dynamic Routing Options)

Syntax no-qos-adjust;

Hierarchy Level [edit dynamic-profiles *profile-name* routing-options**multicast interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Disable hierarchical bandwidth adjustment for all dynamically-created subscriber interfaces that are identified by their MLD or IGMP request from a specific multicast interface.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Managing Subscriber Overcommitment

oif-map (Dynamic IGMP Interface)

Syntax oif-map *map-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **igmp interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Associates an OIF map to the IGMP interface using a dynamic profile. The OIF map is a routing policy statement that can contain multiple terms.

Options ***map-name***—Name of the OIF map.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

oif-map (Dynamic MLD Interface)

Syntax oif-map *map-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **mld interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Associate an outgoing interface (OIF) map to a dynamic MLD logical interface. The OIF map is a routing policy statement that can contain multiple terms.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring Multicast Outgoing Interface Mapping

on-link (Dynamic Router Advertisement)

Syntax (on-link | no-on-link);

Hierarchy Level [edit dynamic-profiles *profile-name* protocols router-advertisement interface *interface-name*prefix *prefix*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Specify whether to enable prefixes to be used for onlink determination:

- **no-on-link**—Disable prefixes from being used for onlink determination.
- **on-link**—Enable prefixes to be used for onlink determination.

Default The configured object is enabled unless explicitly disabled.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring the Prefix Information Included in Neighbor Discovery Advertisements

option

Syntax

```
option {
  [ (id-number option-type option-value)
  (id-number array option-type option-value) ];
}
```

Hierarchy Level [edit access address-assignment pool *pool-name* family (inet | inet6) **dhcp-attributes**]

Release Information Statement introduced in Junos OS Release 9.0.

Description Specify user-defined options that are added to client packets.

Options

array—An option can include an array of option types.

id-number—Any whole number. The ID number is used to index the option and must be unique across a DHCP server.

option-type—Any of the following types: byte, flag, integer, ip-address, short, string, unsigned-integer, or unsigned-short.

option-value—Value associated with an option. The option value must be compatible with the option type (for example, an On or Off value for a flag type).

Required Privilege Level
admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Address-Assignment Pools on page 56

option-60 (DHCP Local Server)

Syntax option-60;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server authentication **username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication **username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server authentication **username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication **username-include**],
[edit system services dhcp-local-server authentication **username-include**],
[edit system services dhcp-local-server group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify that the payload of Option 60 (Vendor Class Identifier) from the client PDU be concatenated with the username during the subscriber authentication process.

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

option-60 (DHCP Relay Agent)

Syntax option-60;

Hierarchy Level
[edit forwarding-options dhcp-relay authentication **username-include**],
[edit forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify that the payload of the Option 60 (Vendor Class Identifier) from the client PDU is concatenated with the username during the subscriber authentication process.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

option-82 (Address-Assignment Pools)

Syntax

```
option-82 {
    circuit-id value range named-range;
    remote-id value range named-range;
}
```

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes **option-match**]

Release Information Statement introduced in Junos OS Release 9.0.

Description Specify the list of option 82 suboption match criteria used to select the named address range used for the client. The server matches the option 82 value in the user PDU to the specified option 82 match criteria and uses the named address range associated with the string.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Address-Assignment Pools on page 56

option-82 (DHCP Local Server Authentication)

Syntax option-82 <circuit-id> <remote-id>;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server authentication **username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication **username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server authentication **username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* authentication **username-include**],
[edit system services dhcp-local-server authentication **username-include**],
[edit system services dhcp-local-server group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify the type of Option 82 information from the client PDU that is concatenated with the username during the subscriber authentication process. You can specify either, both, or neither of the Agent Circuit ID and Agent Remote ID suboptions. If you specify both, the Agent Circuit ID is supplied first, followed by a delimiter, and then the Agent Remote ID. If you specify that neither suboption is supplied, the raw payload of Option 82 from the PDU is concatenated to the username.

Options **circuit-id**—Agent Circuit ID suboption (suboption 1).

remote-id—Agent Remote ID suboption (suboption 2).

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

option-82 (DHCP Local Server Pool Matching)

Syntax option-82;

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **pool-match-order**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **pool-match-order**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **pool-match-order**],
[edit system services dhcp-local-server **pool-match-order**]

Release Information Statement introduced in Junos OS Release 9.0.

Description Configure the extended DHCP local server to use the option 82 value in the DHCP client DHCP PDU together with the ip-address-first method to determine which address-assignment pool to use. You must configure the **ip-address-first** statement before configuring the **option-82** statement. The DHCP local server first determines which address-assignment pool to use based on the ip-address-first method. Then, the local server matches the option 82 value in the client PDU with the option 82 configuration in the address-assignment pool. This statement is supported for IPv4 address-assignment pools only.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool To Use on page 97
- Extended DHCP Local Server Overview on page 84
- Address-Assignment Pools Overview on page 55

option-82 (DHCP Relay Agent)

Syntax option-82 <circuit-id> <remote-id>;

Hierarchy Level [edit forwarding-options dhcp-relay authentication **username-include**],
[edit forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify the option 82 that is concatenated with the username during the subscriber authentication process. You can specify either, both, or neither the Agent Circuit ID and the Agent Remote ID suboptions. If you specify both, the Agent Circuit ID is supplied first, followed by a delimiter, and then the Agent Remote ID. If neither suboption is supplied, the raw payload of option 82 is concatenated to the username.

NOTE: The option 82 value used in creating the username is based on the option 82 value that is encoded in the outgoing (relayed) PDU.

Options **circuit-id**—The string for the Agent Circuit ID suboption (suboption 1).

remote-id—The string for the Agent Remote ID suboption (suboption 2).

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

option-match

Syntax

```
option-match {
  option-82 {
    circuit-id value range named-range;
    remote-id value range named-range;
  }
}
```

Hierarchy Level [edit access address-assignment pool *pool-name* family inet **dhcp-attributes**]

Release Information Statement introduced in Junos OS Release 9.0.

Description Specify a list of match criteria used to determine which named address range in the address-assignment pool to use. The extended DHCP local server matches this information to the match criteria specified in the client PDUs. For example, for option 82 match criteria, the server matches the option 82 value in the user PDU to the specified option 82 string and uses the named range associated with the string.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Address-Assignment Pools on page 56

options

Syntax

```
options {
  accounting-session-id-format (decimal | description);
  client-accounting-algorithm (direct | round-robin);
  client-authentication-algorithm (direct | round-robin);
  ethernet-port-type-virtual;
  interface-description-format {
    exclude-adapter;
    exclude-sub-interface;
  }
  nas-identifier identifier-value;
  nas-port-extended-format {
    adapter-width width;
    port-width width;
    slot-width width;
    stacked-vlan-width width;
    vlan-width width;
  }
  revert-interval interval;
  vlan-nas-port-stacked-format;
}
```

Hierarchy Level [edit access profile *profile-name* radius]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Configure the options used by RADIUS authentication and accounting servers.

The statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring RADIUS Server Parameters for Subscriber Access on page 26
- RADIUS Server Options for Subscriber Access on page 27

order

Syntax order [*accounting-method*];

Hierarchy Level [edit access profile *profile-name* **accounting**]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Set the order in which the Junos OS tries different accounting methods for client activity. When a client logs in, the software tries the accounting methods in the specified order.

Options ***accounting-method***—One or more accounting methods. When a client logs in, the software tries the accounting methods in the following order, from first to last. The only valid value is **radius** for RADIUS accounting.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

order (Mobile IP)

Syntax order (aaa | local);

Hierarchy Level [edit logical-systems *logical-system-name* services **mobile-ip authenticate**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip authenticate**],
[edit routing-instances *routing-instances-name* services **mobile-ip authenticate**],
[edit services **mobile-ip authenticate**],

Release Information Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services mobile-ip authenticate]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip authenticate]**, and **[edit routing-instances *routing-instances-name* services mobile-ip authenticate** hierarchy levels added in Junos OS Release 9.5.

Description Define the authentication method performed for Mobile IP.

Default AAA is the default authentication method.

Options **aaa**—Authentication is performed by AAA. This option is available only in the default router and default routing instance, and therefore only in the **[edit services mobile-ip]** hierarchy level.

local—Authentication is performed using parameters defined in the local database.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Mobile IP on page 315
- Configuring the Access Type for Mobile IP on page 322

origin

Syntax

```
origin {
  host hostname;
  realm realm-name;
}
```

Hierarchy Level [edit diameter]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify values of Origin-Realm-AVP and Origin-Host-AVP used in all messages sent by the Diameter instance.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Diameter on page 233
- Configuring the Origin Attributes of the Diameter Instance on page 234

other-stateful-configuration (Dynamic Router Advertisement)

Syntax (other-stateful-configuration | no-other-stateful-configuration);

Hierarchy Level [edit dynamic-profiles protocols router-advertisement interface *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Specify whether to enable autoconfiguration of other nonaddress-related information:

- **no-other-stateful-configuration**—Disable autoconfiguration of other nonaddress-related information.
- **other-stateful-configuration**—Enable autoconfiguration of other nonaddress-related information.

Default The configured object is disabled unless explicitly enabled.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Enabling Stateful Autoconfiguration with Neighbor Discovery

output (Dynamic Service Sets)

Syntax
```
service-set service-set-name {
    service-filter filter-name;
}
```

Hierarchy Level
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* service],
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos–interface–unit" family *family* service]

Release Information
Statement introduced in Junos OS Release 9.5.
The **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family* service]** hierarchy added in Junos 10.1.

Description
Define the output service sets and filters to be applied to traffic by a dynamic profile. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.

Options
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
- Dynamic Service Sets Overview on page 501
- Associating Service Sets to Interfaces in a Dynamic Profile on page 527

output-traffic-control-profile (Dynamic CoS Definition)

Syntax
```
output-traffic-control-profile profile-name;
```

Hierarchy Level
[edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number*]

Release Information
Statement introduced in Junos OS Release 9.2.

Description
Apply an output traffic scheduling and shaping profile to the logical interface.

Options
profile-name—Name of the traffic-control profile to be applied to this interface

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile on page 617
- **traffic-control-profiles on page 1144**

output-vlan-map (Dynamic Interfaces)

Syntax

```
output-vlan-map {
  inner-tag-protocol-id tpid;
  inner-vlan-id number;
  (pop | swap);
  tag-protocol-id tpid;
  vlan-id number;
}
```

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 10.4.

Description For dynamic interfaces, define the rewrite profile to be applied to outgoing frames on this logical interface.

The 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

- Stacking and Rewriting VLAN Tags for the Layer 2 Wholesale Solution

overhead-accounting (Dynamic Traffic Shaping)

Syntax overhead-accounting (*shaping-mode*) <bytes (*byte-value*);

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service traffic-control-profiles** *profile-name*]

Release Information Statement introduced in Junos OS Release 10.2.

Description Configure the mode to shape downstream ATM traffic based on either frames or cells.

Default The default is **frame-mode**.

Options *shaping-mode*—One of the following shaping mode parameters:

- **frame-mode**—Shaping based on the number of bytes in the frame, without regard to cell encapsulation or padding overhead.
- **cell-mode**—Shaping based on the number of bytes in cells, and accounts for the ATM cell encapsulation and padding overhead. The resulting traffic stream conforms to the policing rates configured in downstream ATM switches, reducing the number of packet drops in the Ethernet network
- **$junos-cos-shaping-mode**—Variable for the shaping mode that is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.

byte-value—Byte adjustment value for the cell or shaping mode, or the Junos predefined variable:

$junos-cos-byte-adjust—Variable for byte adjustment that is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.

Range: –120 through 124 bytes

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 688
- Bandwidth Management for Downstream Traffic in Edge Networks Overview on page 679
- egress-shaping-overhead

overrides (DHCP Local Server)

Syntax

```
overrides {
    client-discover-match;
    interface-client-limit number;
    no-arp;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **interface** *interface-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **interface** *interface-name*],
[edit logical-systems *logical-system-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **dhcpv6**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 **group** *group-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* **interface** *interface-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server **group** *group-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* **interface** *interface-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **interface** *interface-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **interface** *interface-name*],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **interface** *interface-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **interface** *interface-name*],
[edit system services **dhcp-local-server**],
[edit system services dhcp-local-server **dhcpv6**],

[edit system services dhcp-local-server dhcpv6 **group** *group-name*],
[edit system services dhcp-local-server dhcpv6 group *group-name* **interface** *interface-name*],
[edit system services dhcp-local-server **group** *group-name*],
[edit system services dhcp-local-server group *group-name* **interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 9.2.

Description Override the default configuration settings for the extended DHCP local server. Specifying the **overrides** statement with no subordinate statements removes all DHCP local server overrides at that hierarchy level.

- To override global DHCP local server configuration options, include the **overrides** statement and its subordinate statements at the **[edit system services dhcp-local-server]** hierarchy level.
- To override configuration options for a named group of interfaces, include the statements at the **[edit system services dhcp-local-server group *group-name*]** hierarchy level.
- To override configuration options for a specific interface within a named group of interfaces, include the statements at the **[edit system services dhcp-local-server group *group-name* interface *interface-name*]** hierarchy level.
- Use the **[edit system services dhcp-local-server dhcpv6]** hierarchy level to override DHCPv6 configuration options.

The statements are explained separately. The **interface-client-limit** and **no-arp** statements are not supported in the **[edit system services dhcp-local-server dhcpv6]** hierarchy level.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Extended DHCP Local Server Overview on page 84
- Overriding Default DHCP Local Server Configuration Settings on page 101
- Deleting DHCP Local Server and DHCP Relay Override Settings on page 108

overrides (DHCP Relay Agent)

Syntax

```
overrides {
    allow-snooped-clients;
    always-write-giaddr;
    always-write-option-82;
    client-discover-match <option60–and-option82>;
    disable-relay;
    interface-client-limit number;
    layer2-unicast-replies;
    no-allow-snooped-clients;
    no-arp;
    no-bind-on-request;
    proxy-mode;
    replace-ip-source-with;
    send-release-on-delete;
    trust-option-82;
}
```

Hierarchy Level

[edit forwarding-options **dhcp-relay**],
[edit forwarding-options dhcp-relay **group** *group-name*],
[edit forwarding-options dhcp-relay group *group-name* **interface** *interface-name*],
[edit logical-systems *logical-system-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **group** *group-name*],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **interface** *interface-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **interface** *interface-name*],
[edit routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name*],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **interface** *interface-name*]

Release Information

Statement introduced in Junos OS Release 8.3.

Description

Override the default configuration settings for the extended DHCP relay agent. Specifying the **overrides** statement with no subordinate statements removes all DHCP relay agent overrides at that hierarchy level.

- To override global DHCP relay configuration options, include the **overrides** statement and its subordinate statements at the **[edit forwarding-options dhcp-relay]** hierarchy level.
- To override configuration options for a named group of interfaces, include the statements at the **[edit forwarding-options dhcp-relay group *group-name*]** hierarchy level.

- To override configuration options for a specific interface within a named group of interfaces, include the statements at the **[edit forwarding-options dhcp-relay group *group-name* interface *interface-name*]** hierarchy level.

The 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
- Extended DHCP Relay Agent Overview on page 136
- Overriding the Default DHCP Relay Configuration Settings on page 150
- Deleting DHCP Local Server and DHCP Relay Override Settings on page 108

packet-triggered-subscribers

Syntax

```
packet-triggered-subscribers {
  partition partition-name {
    destination-host hostname;
    destination-realm realm;
    diameter-instance instance-name;
  }
}
```

Hierarchy Level [edit system services]

Release Information Statement introduced in Junos OS Release 10.2.

Description Configure PTSP to interact with an SAE in an SRC environment to provision packet-triggered subscribers.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring the PTSP Partition on page 284

packet-triggered-subscribers-partition

Syntax packet-triggered-subscribers-partition *partition-name*;

Hierarchy Level [edit system]

Release Information Statement introduced in Junos OS Release 10.2.

Description Specify the PTSP partition to associate with the logical system and routing instance.

Options *partition-name*—Name of the PTSP partition that you want PTSP to use. The name is defined with the **partition** statement at the **[edit system services packet-triggered-subscribers]** hierarchy level.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Assigning the PTSP Partition on page 284

padn (Domain Maps)

Syntax
```
padn destination-address {
  mask destination-mask;
  metric route-metric;
}
```

Hierarchy Level [edit access domain map *domain-map-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Configure PADN parameters for a domain map.

Options *destination*—IP address of the destination.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring PADN Parameters for a Domain Map on page 74

pap (Dynamic PPP)

Syntax pap;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces pp0 unit** "$junos-interface-unit" **ppp-options**]

Release Information Statement introduced in Junos OS Release 9.5.

Description Specify PAP authentication in a PPP dynamic profile.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Dynamic Profiles Overview on page 325
- Configuring Dynamic Authentication for PPP Subscribers on page 199
- Attaching Dynamic Profiles to Static PPP Subscriber Interfaces on page 203

parse-direction (Domain Maps)

Syntax parse-direction (left-to-right | right-to-left);

Hierarchy Level [edit access **domain**]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the direction in which the router searches for the domain name in a username.

Default **right-to-left** is used by default.

Options
left-to-right—The router searches starting at the left-most character. When the router reaches a domain delimiter, it uses anything to the right of the delimiter as the domain name.

right-to-left—The router searches starting at the right-most character. When the router reaches a domain delimiter, it uses anything to the right of the delimiter as the domain name.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Specifying the Parsing Direction for Domain Names on page 73
- Configuring Domain Name Usage for Domain Maps on page 71

partition

Syntax

```
partition partition-name {
    diameter-instance instance-name;
    destination-host hostname;
    destination-realm realm;
}
```

Hierarchy Level [edit jsrc]

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure a JSRC partition.

Options *partition-name*—Name of the JSRC partition.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring JSRC on page 251
- Configuring the JSRC Partition on page 252

partition (PTSP)

Syntax

```
partition partition-name {
    destination-host hostname;
    destination-realm realm;
    diameter-instance instance-name;
}
```

Hierarchy Level [edit system services packet-triggered-subscribers]

Release Information Statement introduced in Junos OS Release 10.2.

Description Configure a PTSP partition.

Options *partition-name*—Name of the PTSP partition.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring the PTSP Partition on page 284

passive (Dynamic IGMP Interface)

Syntax passive <allow-receive> <send-general-query> <send-group-query>;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **igmp interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 9.6.
allow-receive, **send-general-query**, and **send-group-query** options were added in Junos OS Release 10.0.

Description Dynamically specify that IGMP run on the interface and either not send and receive control traffic or selectively send and receive control traffic such as IGMP reports, queries, and leaves.

NOTE: You can selectively activate up to two out of the three available options for the passive statement while keeping the other functions passive (inactive). Activating all three options would be equivalent to not using the passive statement.

Options

allow-receive—Enables IGMP to receive control traffic on the interface.

send-general-query—Enables IGMP to send general queries on the interface.

send-group-query—Enables IGMP to send group-specific and group-source-specific queries on the interface.

Required Privilege Level

routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring Multicast Outgoing Interface Mapping
- For general information about configuring IGMP, see the *Junos OS Multicast Protocols Configuration Guide*.

passive (Dynamic MLD Interface)

Syntax passive;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **mld interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Specify that MLD run on the interface and either not send and receive control traffic or selectively send and receive control traffic such as MLD reports, queries, and leaves.

NOTE: You can selectively activate up to two out of the three available options for the passive statement while keeping the other functions passive (inactive). Activating all three options would be equivalent to not using the passive statement.

Options **allow-receive**—Enables IGMP to receive control traffic on the interface.

send-general-query—Enables IGMP to send general queries on the interface.

send-group-query—Enables IGMP to send group-specific and group-source-specific queries on the interface.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring Multicast Outgoing Interface Mapping

password (DHCP Local Server)

Syntax password *password-string*;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server authentication**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **dhcpv6 authentication**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **group** *group-name* **authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server authentication**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication**],
[edit system services **dhcp-local-server authentication**],
[edit system services dhcp-local-server **dhcpv6**],
[edit system services dhcp-local-server dhcpv6 **group** *group-name* **authentication**],
[edit system services dhcp-local-server **group** *group-name* **authentication**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Configure the password that is sent to the external AAA authentication server for subscriber authentication.

Options ***password-string***—Authentication password.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

password (DHCP Relay Agent)

Syntax password *password-string*;

Hierarchy Level [edit forwarding-options dhcp-relay **authentication**],
[edit forwarding-options dhcp-relay group *group-name* **authentication**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **authentication**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **authentication**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **authentication**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **authentication**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Configure the password that is sent to the external AAA authentication server for subscriber authentication.

Options ***password-string***—Authentication password.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

password (Static Subscribers)

Syntax

```
password password-string;
  username-include {
    domain-name domain-name;
    username-include;
    logical-system-name;
    routing-instance-name;
    user-prefix user-prefix-string;
  }
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers group *group-name* **authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers **authentication**],
[edit logical-systems *logical-system-name* system services static-subscribers **authentication**],
[edit logical-systems *logical-system-name* system services static-subscribers group *group-name* **authentication**],
[edit routing-instances *routing-instances-name* system services static-subscribers **authentication**],
[edit routing-instances *routing-instances-name* system services static-subscribers group *group-name* authentication username-include], **authentication**],
[edit system services static-subscribers **authentication**]
[edit system services static-subscribers group *group-name* **authentication**]

Release Information

Statement introduced in Junos OS Release 9.6.

Description

Specify the password that is sent to AAA for user login for all static subscribers on interfaces configured at the **[edit system services static-subscribers interface]** hierarchy level, or for the subscribers in a specified group. The group version of the statement takes precedence over the global version.

Options

password-string—String that defines the password.

The remaining statements are explained separately.

Required Privilege Level

system-level—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259
- Configuring the Static Subscriber Global Authentication Password on page 265
- Configuring the Static Subscriber Group Authentication Password on page 268

peer

Syntax

```
peer {
  (ip-address address | nai name@domain) {
    spi hexadecimal-value {
      algorithm (hmac-md5 | md5);
      entity-type (host | mobility-agent);
      key (hex | ascii) string;
      replay-method (timestamp seconds | none);
    }
  }
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* services **mobile-ip**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip**],
[edit routing-instances *routing-instances-name* services **mobile-ip**],
[edit services **mobile-ip**]

Release Information

Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services mobile-ip]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip]**, and **[edit routing-instances *routing-instances-name* services mobile-ip]** hierarchy levels added in Junos OS Release 9.5.

Description

Define the authentication configurations for a home agent mobile node. An authentication enables the registration message as acceptable to the final recipient of the registration message.

Options

ip-address *address*—IP address of the peer.

nai *name*@*domain*—Network address identifier (NAI) of the peer. The *name* can include only alphanumeric characters, dots, hyphens, or underscores. The *name* cannot end in @; @ must be used to separate *name* and *domain*. The *domain* can include only alphanumeric characters, dots, or hyphens The *domain* must be in the format *domain.suffix*, where the *suffix* is com, org, net, and so on. The *suffix* must consist of at least two alphanumeric characters.

The remaining statements are explained separately.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Mobile IP on page 315
- Configuring the Mobile IP Home Agent on page 319

peer (Diameter Base Protocol)

Syntax

```
peer peer-name {
  address ip-address;
  connect-actively {
    port port-number;
  }
  logical-system logical-system-name <routing-instance routing-instance-name>;
  routing-instance routing-instance-name;
}
```

Hierarchy Level [edit diameter]

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure a remote peer for the Diameter instance.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Diameter on page 233
- Configuring Diameter Network Elements on page 235
- Configuring Diameter Peers on page 234

peer (Diameter Network Element)

Syntax

```
peer peer-name {
  priority priority-value;
}
```

Hierarchy Level [edit diameter network-element element-name]

Release Information Statement introduced in Junos OS Release 9.6.

Description Define and prioritize a peer associated with a Diameter network element.

Options *peer-name*—Name of the peer.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Diameter on page 233
- Configuring Diameter Network Elements on page 235
- Configuring Diameter Peers on page 234

pool (Address-Assignment Pools)

Syntax

```
pool pool-name {
  family family {
    dhcp-attributes {
      [ protocol-specific attributes ]
    }
    host hostname {
      hardware-address mac-address;
      ip-address ip-address;
    }
    network ip-prefix/<prefix-length>;
    prefix ipv6-prefix;
    range range-name {
      high upper-limit;
      low lower-limit;
      prefix-length prefix-length;
    }
  }
  link pool-name;
}
```

Hierarchy Level [edit access address-assignment]

Release Information Statement introduced in Junos OS Release 9.0.

Description Configure the name of an address-assignment pool.

The remaining statements are explained separately.

Options ***pool-name***—Name assigned to the address-assignment pool.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56

pool-match-order

Syntax

```
pool-match-order {
    external-authority;
    ip-address-first;
    option-82;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit system services **dhcp-local-server**]

Release Information

Statement introduced in Junos OS Release 9.0.

Description

Configure the order in which the DHCP local server uses information in the DHCP client PDU to determine how to obtain an address for the client.

The statements are explained separately.

Default

DHCP local server uses the **ip-address-first** method to determine which address pool to use.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring How the Extended DHCP Local Server Determines Which Address-Assignment Pool To Use on page 97
- Extended DHCP Local Server Overview on page 84

pop (Dynamic VLANs)

Syntax

```
pop;
```

Hierarchy Level

[edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **output-vlan-map**]

Release Information

Statement introduced in Junos OS Release 10.4.

Description

For dynamic VLAN interfaces, specify the VLAN rewrite operation to remove a VLAN tag from the top of the VLAN tag stack. The outer VLAN tag of the frame is removed.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Removing a VLAN Tag
- Stacking and Rewriting VLAN Tags for the Layer 2 Wholesale Solution

port

Syntax port *port-number*;

Hierarchy Level [edit access **radius-server** *server-address*],
[edit access profile *profile-name* **radius-server** *server-address*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure the port number on which to contact the RADIUS server.

Options ***port-number***—Port number on which to contact the RADIUS server.
Default: 1812 (as specified in RFC 2865)

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Router or Switch Interaction with RADIUS Servers on page 19
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

port (Diameter Base Protocol)

Syntax port *port-number*;

Hierarchy Level [edit **diameter peer** *peer-name* **connect-actively**]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify the destination TCP port used by the active connection to peer.

Options ***port-number***—Number of the TCP port.
Default: 3868

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Diameter on page 233
- Configuring Diameter Peers on page 234

post-service-filter (Dynamic Service Sets)

Syntax post-service-filter *filter-name*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **family** *family* **service input**],
[edit **dynamic-profiles** *profile-name* **interfaces** pp0 **unit** "$junos–interface–unit" **family** *family* **service input**]

Release Information Statement introduced in Junos OS Release 9.5.
The **[edit dynamic-profiles** ***profile-name*** **interfaces pp0 unit "$junos-interface-unit" family** ***family*** **service input]** hierarchy added in Junos 10.1.

Description Define the filter to be applied to traffic after service processing. The filter is applied only if a service set is configured and selected. You can configure a postservice filter on the input side of the interface only. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.

Options ***filter-name***—Identifier for the post-service filter.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Dynamic Service Sets Overview on page 501
- Associating Service Sets to Interfaces in a Dynamic Profile on page 527

pp0 (Dynamic PPPoE)

Syntax

```
pp0 {
  unit logical-unit-number {
    keepalives interval seconds;
    no-keepalives;
    pppoe-options {
      underlying-interface interface-name;
      server;
    }
    ppp-options {
      chap;
      pap;
    }
    family inet {
      unnumbered-address interface-name destination address destination-profile
        profile-name;
      address address;
      service {
        input {
          service-set service-set-name {
            service-filter filter-name;
          }
          post-service-filter filter-name;
        }
        output {
          service-set service-set-name {
            service-filter filter-name;
          }
        }
      }
      filter {
        input filter-name {
          precedence precedence;
        }
        output filter-name {
          precedence precedence;
        }
      }
    }
  }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces]

Release Information Statement introduced in Junos OS Release 10.1.

Description Configure the dynamic PPPoE logical interface in a dynamic profile. When the router creates a dynamic PPPoE logical interface on an underlying Ethernet interface configured with PPPoE (**ppp-over-ether**) encapsulation, it uses the information in the dynamic profile to determine the properties of the dynamic PPPoE logical 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
- Configuring a Basic PPPoE Dynamic Profile on page 468
- Configuring a PPPoE Dynamic Profile with Additional Options on page 471
- For information about creating static PPPoE interfaces, see Configuring PPPoE

pppoe-options (Dynamic PPPoE)

Syntax
```
pppoe-options {
  underlying-interface interface-name;
  server;
}
```

Hierarchy Level
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit"]

Release Information
Statement introduced in Junos OS Release 10.1.

Description
Configure the underlying interface and PPPoE server mode for a dynamic PPPoE logical interface in a dynamic profile.

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 a Basic PPPoE Dynamic Profile on page 468
- For information about creating static PPPoE interfaces, see the *Junos OS Network Interfaces Configuration Guide*

pppoe-underlying-options (Dynamic PPPoE)

Syntax

```
pppoe-underlying-options {
  access-concentrator name;
  dynamic-profile profile-name;
  duplicate-protection;
  max-sessions number;
}
```

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Configure PPPoE-specific interface properties for the underlying Ethernet interface on which the router creates a dynamic PPPoE logical interface. The underlying interface must be configured with PPPoE (**ppp-over-ether**) encapsulation.

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 an Underlying Interface for Dynamic PPPoE Subscriber Interfaces on page 473
- For information about creating static PPPoE interfaces, see the *Junos OS Network Interfaces Configuration Guide*

ppp-options (Dynamic PPP)

Syntax

```
ppp-options {
  chap;
  pap;
}
```

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces pp0 unit** "$junos-interface-unit"]

Release Information Statement introduced in Junos OS Release 9.5.

Description Configure PPP-specific interface properties in a dynamic profile.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Dynamic Profiles Overview on page 325
- Configuring Dynamic Authentication for PPP Subscribers on page 199
- Attaching Dynamic Profiles to Static PPP Subscriber Interfaces on page 203

ppp-subscriber-services

Syntax ppp-subscriber-services (disable | enable);

Hierarchy Level [edit chassis]

Release Information Statement introduced in Junos OS Release 10.2.

Description Enable dynamic PPP subscriber services on non-PPPoE interfaces on certain PICs.

NOTE: When you include this statement, the relevant PICs restart. This action disrupts subscribers already logged in via those PICs. You can confirm completion of the restart by issuing the **show chassis pic fpc-slot** *slot-number* **pic-slot** *slot-number* command.

Options **disable**—Disable subscriber services.

enable—Enable subscriber services.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- For hardware requirements, see Hardware Requirements for PPP Subscriber Services on Non-Ethernet Interfaces on page 206
- show chassis pic
- Attaching Dynamic Profiles to MLPPP Bundles on page 207

precedence

Syntax precedence *precedence*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **family** *family* **filter input** *filter-name*],
[edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **family** *family* **filter output** *filter-name*],
[edit **dynamic-profiles** *profile-name* **interfaces demux0 unit** *logical-unit-number* **family** *family* **filter input** *filter-name*],
[edit **dynamic-profiles** *profile-name* **interfaces demux0 unit** *logical-unit-number* **family** *family* **filter output** *filter-name*],
[edit **dynamic-profiles** *profile-name* **interfaces pp0 unit** "$junos–interface–unit" **family** *family* **filter input** *filter-name*],
[edit **dynamic-profiles** *profile-name* **interfaces pp0 unit** "$junos–interface–unit" **family** *family* **filter output** *filter-name*]

Release Information Statement introduced in Junos OS Release 9.3.
The **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family inet filter input *filter-name*]** hierarchy and **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family inet filter output *filter-name*]** hierarchy added in Junos 10.1.

Description Apply a precedence to a dynamic filter. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.

Options ***precedence***—Precedence value for the filter. The lower the precedence value, the higher the precedence.

Range: 0 through 250

Default: 0

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- For general information about configuring firewall filters, see the *Junos OS Policy Framework Configuration Guide*
- Dynamic Firewall Filters Overview on page 487
- Classic Filters Overview on page 488
- Fast Update Filters Overview on page 496
- Basic Classic Filter Syntax on page 490
- Basic Fast Update Filter Syntax on page 499

predefined-variable-defaults (Dynamic Profiles)

Syntax predefined-variable-defaults *predefined-variable* <*variable-option*> *default-value*

Hierarchy Level [edit **dynamic-profiles** *profile-name*]

Release Information Statement introduced in Junos OS Release 10.2.

Description Configure default values for the predefined variables that are configured in a dynamic profile. These default values are used when RADIUS does not supply a value.

Options

predefined-variable—Name of the predefined variable to which you want to assign a default value. Do not include the junos prefix.

variable-option—Name of the specific variable option to which you want to assign a default value. Only certain predefined variables support multiple default values.

default-value—Default value that you want to assign to the predefined variable.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Default Values for Predefined Variables in a Dynamic Profile on page 351

preference

Syntax preference *route-distance*;

Hierarchy Level [edit dynamic-profiles routing-options **access route** *prefix*]

Release Information Statement introduced in Junos OS Release 9.5.

Description Dynamically configure the distance for an access route.

Options

route-distance—Either the specific distance you want to assign to the access route or the distance variable ($junos-framed-route-distance). The distance variable is dynamically replaced with the value in Framed-Route Attribute [22].

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring Dynamic Access Routes for Subscriber Management on page 186

preference (Tunnel Profile)

Syntax preference *number*;

Hierarchy Level [edit access tunnel-profile *profile-name* tunnel *tunnel-id*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the preference for a tunnel. You can specify up to 8 levels of preference, and you can assign the same preference to a maximum of 31 tunnels. When you define multiple preferences for a destination, you increase the probability of a successful connection.

This value can be overridden by RADIUS attribute Tunnel-Preference [83].

Options *number*—Number that indicates the order in which the router attempts to connect to the destination. Zero is the highest level of preference.

Range: 0 through 2000

Default: 2000

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring a Tunnel Profile for Subscriber Access on page 219

preferred-lifetime (Dynamic Router Advertisement)

Syntax preferred-lifetime *seconds*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols router-advertisement interface *interface-name*prefix *prefix*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Specify how long the prefix generated by stateless autoconfiguration remains preferred.

Options *seconds*—Preferred lifetime, in seconds. If you set the preferred lifetime to **0xffffffff**, the lifetime is infinite. The preferred lifetime is never greater than the valid lifetime.

Default: 604,800 seconds

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- valid-lifetime
- Configuring the Prefix Information Included in Neighbor Discovery Advertisements

preferred-source-address

Syntax preferred-source-address *address*;

Hierarchy Level [edit **dynamic-profiles interfaces** *interface-name* **unit** *logical-unit-number* **family** *family* **unnumbered-address** *interface-name*],
[edit **dynamic-profiles** *profile-name* **interfaces demux0 unit** *logical-unit-number* **family** *family*],

Release Information Statement introduced in Junos OS Release 9.2.
Support for the **$junos-preferred-source-address** predefined variable added in Junos OS Release 9.6.

Description For unnumbered Ethernet interfaces configured with a loopback interface as the donor interface, specify one of the loopback interface's secondary addresses as the preferred source address for the unnumbered Ethernet interface. Configuring the preferred source address enables you to use an IP address other than the primary IP address on some of the unnumbered Ethernet interfaces in your network. To configure the preferred source address dynamically, include the **$junos-preferred-source-address** predefined variable.

Configuration of a preferred source address for unnumbered Ethernet interfaces is supported for IPv4 and IPv6 address families.

Options ***address***—Secondary IP address of the donor loopback interface. Use the **$junos-preferred-source-address** dynamic variable to dynamically apply a preferred source address to the unnumbered Ethernet interface.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring an Unnumbered Interface
- *Junos OS Network Interfaces Configuration Guide*
- *Junos OS System Basics Configuration Guide*

prefix (Address-Assignment Pools)

Syntax prefix *ipv6-prefix*;

Hierarchy Level [edit access address-assignment **pool** *pool-name* **family** inet6]

Release Information Statement introduced in Junos OS Release 10.0.

Description Specify the IPv6 prefix for the IPv6 address-assignment pool. This statement is mandatory for IPv6 address-assignment pools.

Options ***ipv6-prefix***—IPv6 prefix.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56

prefix (DHCP Relay Agent)

Syntax prefix *prefix*;

Hierarchy Level [edit forwarding-options dhcp-relay relay-option-82 **circuit-id**],
[edit forwarding-options dhcp-relay group *group-name* relay-option-82 **circuit-id**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay relay-option-82 **circuit-id**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* relay-option-82 **circuit-id**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-82 **circuit-id**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-82 **circuit-id**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-82 **circuit-id**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-82 **circuit-id**]

Release Information Statement introduced in Junos OS Release 8.3.

Description Add a prefix to the base option 82 Agent Circuit ID information in DHCP packets destined for a DHCP server. The prefix can consist of any combination of the hostname, logical system name, and routing instance name.

If you include only the hostname, only the logical system name, or only the routing instance name in the prefix, the format of the Agent Circuit ID information for Fast Ethernet or Gigabit Ethernet interfaces with stacked virtual LANs (S-VLANs) is one of the following:

host-name:(fe | ge)-*fpc/pic/port*:*svlan-id-vlan-id*
logical-system-name:(fe | ge)-*fpc/pic/port*:*svlan-id-vlan-id*
routing-instance-name:(fe | ge)-*fpc/pic/port*:*svlan-id-vlan-id*

If you include both the logical system name and the routing instance name in the prefix, the format of the Agent Circuit ID information for Fast Ethernet or Gigabit Ethernet interfaces with S-VLANs is as follows:

logical-system-name;*routing-instance-name*:(fe | ge)-*fpc/pic/port*:*svlan-id-vlan-id*

If you include the hostname, logical system name, and routing instance name in the prefix, the format of the Agent Circuit ID information for Fast Ethernet or Gigabit Ethernet interfaces with S-VLANs is as follows:

host-name/logical-system-name;*routing-instance-name*:(fe | ge)-*fpc/pic/port*:*svlan-id-vlan-id*

For Fast Ethernet or Gigabit Ethernet interfaces that use virtual LANs (VLANs) but not S-VLANs, only the ***vlan-id*** value appears in the Agent Circuit ID format. For Fast Ethernet or Gigabit Ethernet interfaces that do not use VLANs or S-VLANs, neither the ***vlan-id*** value nor the ***svlan-id*** value appears.

Options *prefix*—Any combination of the following:

- **host-name**—Prepend the hostname of the router configured with the **host-name** statement at the **[edit system]** hierarchy level to the Agent Circuit ID information.
- **logical-system-name**—Prepend the name of the logical system to the Agent Circuit ID information.
- **routing-instance-name**—Prepend the name of the routing instance to the Agent Circuit ID information.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Enabling and Disabling Insertion of Option 82 Information on page 172
- Configuring an Option 82 Prefix on page 173

prefix (Dynamic Router Advertisement)

Syntax

```
prefix prefix {
  (autonomous | no-autonomous);
  (on-link | no-on-link);
  preferred-lifetime seconds;
  valid-lifetime seconds;
}
```

Hierarchy Level
[edit dynamic-profiles protocols router-advertisement **interface** *interface-name*]

Release Information
Statement introduced in Junos OS Release 10.1.

Description
Configure the prefix name in router advertisement messages.

Options
prefix—Prefix name. For dynamic configuration, specify the ***$junos-ipv6–ndra-prefix*** dynamic variable.

The remaining statements are explained separately.

Required Privilege Level
routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring the Prefix Information Included in Neighbor Discovery Advertisements

pre-ietf-mode

Syntax pre-ietf-mode

Hierarchy Level [edit protocols **ancp**],
[edit protocols **ancp neighbor**]

Release Information Statement introduced in Junos OS Release 9.4.

Description Configure ANCP to run in a mode that is backward compatible with Internet draft draft-ietf-ancp-protocol-00.txt, *Protocol for Access Node Control Mechanism in Broadband Networks* for all neighbors or for a specific neighbor.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring ANCP on page 713
- Configuring ANCP for Backward Compatibility on page 719
- Configuring ANCP Neighbors on page 717

priority (Diameter Base Protocol)

Syntax priority *priority-value*;

Hierarchy Level [edit **diameter network-element** *element-name* **peer** *peer-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Set the priority for a peer within a Diameter network element. A peer with a lower number has a higher priority.

Options ***priority-value***—Priority for the peer within the network element.
Range: 1 through 65535

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Diameter on page 233
- Configuring Diameter Network Elements on page 235

priority (Dynamic Schedulers)

Syntax priority (*priority-level* | $junos-cos-scheduler-priority);

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service schedulers** *scheduler-name*]

Release Information Statement introduced in Junos OS Release 9.3.
The **$junos-cos-scheduler-bs** predefined variable added in Junos OS Release 9.4.

Description Specify packet-scheduling priority value in a dynamic profile.

Options ***priority-level***—one of the following packet-scheduling priority values:

- **low**—Scheduler has low priority.
- **medium-low**—Scheduler has medium-low priority.
- **medium-high**—Scheduler has medium-high priority.
- **high**—Scheduler has high priority. Assigning high priority to a queue prevents the queue from being underserved.
- **strict-high**—Scheduler has strictly high priority. Configure a **high** priority queue with unlimited transmission bandwidth available to it. As long as it has traffic to send, the **strict-high** priority queue receives precedence over **low**, **medium-low**, and **medium-high** priority queues, but not **high** priority queues. You can configure **strict-high** priority on only one queue per interface.

$junos-cos-scheduler-pri—Junos predefined variable that is replaced with the packet-scheduling priority value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 611
- Dynamic Variables Overview on page 327
- **scheduler (Dynamic Scheduler Maps) on page 1084**

profile

Syntax

```
profile profile-name {
  accounting {
    accounting-stop-on-access-deny;
    accounting-stop-on-failure;
    coa-immediate-update;
    immediate-update;
    order [ accounting-method ];
    statistics (time | volume-time);
    update-interval minutes;
    }
  authentication-order [ authentication-methods ];
  client client-name {
    chap-secret chap-secret;
    group-profile profile-name;
    ike {
      allowed-proxy-pair {
        remote remote-proxy-address local local-proxy-address;
      }
      pre-shared-key (ascii-text character-string | hexadecimal hexadecimal-digits);
      ike-policy policy-name;
      interface-id string-value;
    }
    l2tp {
      interface-id interface-id;
      lcp-renegotiation;
      local-chap;
      maximum-sessions-per-tunnel number;
      multilink {
        drop-timeout milliseconds;
        fragmentation-threshold bytes;
      }
      ppp-authentication (chap | pap);
      ppp-profile profile-name;
      shared-secret shared-secret;
    }
    pap-password pap-password;
    ppp {
      cell-overhead;
      encapsulation-overhead bytes;
      framed-ip-address ip-address;
      framed-pool framed-pool;
      idle-timeout seconds;
      interface-id interface-id;
      keepalive seconds;
      primary-dns primary-dns;
      primary-wins primary-wins;
      secondary-dns secondary-dns;
      secondary-wins secondary-wins;
    }
    user-group-profile profile-name;
  }
  radius {
```

```
accounting-server [ ip-address ];
authentication-server [ ip-address ];
options {
  accounting-session-id-format (decimal | description);
  client-accounting-algorithm (direct | round-robin);
  client-authentication-algorithm (direct | round-robin);
  ethernet-port-type-virtual;
  interface-description-format {
    exclude-adapter;
    exclude-sub-interface;
  }
  nas-identifier identifier-value;
  nas-port-extended-format {
    adapter-width width;
    port-width width;
    slot-width width;
    stacked-vlan-width width;
    vlan-width width;
  }
  revert-interval interval;
  vlan-nas-port-stacked-format;
}
attributes {
  exclude {
    accounting-authentic [ accounting-on | accounting-off ];
    accounting-delay-time [ accounting-on | accounting-off ];
    accounting-session-id [ access-request | accounting-on | accounting-off |
      accounting-stop ];
    accounting-terminate-cause [ accounting-off ];
    called-station-id [ access-request | accounting-start | accounting-stop ];
    calling-station-id [ access-request | accounting-start | accounting-stop ];
    class [ accounting-start | accounting-stop ];
    dhcp-gi-address [ access-request | accounting-start | accounting-stop ];
    dhcp-mac-address [ access-request | accounting-start | accounting-stop ];
    event-timestamp [ accounting-on | accounting-off | accounting-start |
      accounting-stop ];
    framed-ip-address [ accounting-start | accounting-stop ];
    framed-ip-netmask [ accounting-start | accounting-stop ];
    input-filter [ accounting-start | accounting-stop ];
    input-gigapackets [ accounting-stop ];
    input-gigawords [ accounting-stop ];
    interface-description [ access-request | accounting-start | accounting-stop ];
    nas-identifier [ access-request | accounting-on | accounting-off | accounting-start
      | accounting-stop ];
    nas-port [ access-request | accounting-start | accounting-stop ];
    nas-port-id [ access-request | accounting-start | accounting-stop ];
    nas-port-type [ access-request | accounting-start | accounting-stop ];
    output-filter [ accounting-start | accounting-stop ];
    output-gigapackets [ accounting-stop ];
    output-gigawords [ accounting-stop ];
  }
  ignore {
    framed-ip-netmask;
    input-filter;
    logical-system:routing-instance;
    output-filter;
```

```
        }
      }
    }
    radius-server server-address {
      accounting-port port-number;
      port port-number;
      retry attempts;
      routing-instance routing-instance-name;
      secret password;
      source-address source-address;
      timeout seconds;
    }
}
```

Hierarchy Level [edit access]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure PPP CHAP, or a profile and its subscriber access, L2TP, or PPP properties.

Options ***profile-name***—Name of the profile.

For CHAP, the name serves as the mapping between peer identifiers and CHAP secret keys. This entity is queried for the secret key whenever a CHAP challenge or response is received.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring the PPP Authentication Protocol
- Configuring Access Profiles for L2TP or PPP Parameters
- Configuring L2TP Properties for a Client-Specific Profile
- Configuring PPP Properties for a Client-Specific Profile
- AAA Service Framework Overview on page 18

promiscuous-mode

Syntax promiscuous-mode;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **igmp interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 9.2.

Description Specify that the interface accepts IGMP reports from hosts on any subnetwork.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring a Dynamic Profile for Client Access on page 353
- For information about how to use IGMP promiscuous mode, see "Accepting IGMP Messages from Remote Subnetworks" in the *Junos OS Multicast Protocols Configuration Guide*

protocol (Dynamic Schedulers)

Syntax protocol (any | non-tcp | tcp);

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service schedulers** *scheduler-name* **drop-profile-map**]

Release Information Statement introduced in Junos OS Release 9.3.

Description Specify the protocol type for the specified scheduler in a dynamic profile.

Options **any**—Accept any protocol type.

non-tcp—Accept any protocol type other than TCP/IP.

tcp—Accept only TCP/IP protocol.

NOTE: Protocol types non-tcp and tcp are not supported on MX Series routers.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 611

protocols (Dynamic Profiles)

Syntax

```
protocols {
  igmp {
    interface interface-name {
      accounting;
      disable;
      group-policy;
      immediate-leave
      no-accounting;
      promiscuous-mode;
      ssm-map ssm-map-name;
      static {
        group group {
          source source;
        }
      }
      version version;
    }
    mld {
      interfaceinterface-name {
        disable;
        (accounting | no-accounting);
        group-policy;
        immediate-leave;
        oif-map;
        passive;
        ssm-map ssm-map-name;
        static {
          group multicast-group-address {
            exclude;
            group-count number;
            group-increment increment;
            source ip-address {
              source-count number;
              source-increment increment;
            }
          }
        }
        version version;
      }
    }
    router-advertisement {
      interfaceinterface-name {
        current-hop-limitnumber;
        default-lifetime seconds;
        (managed-configuration | no-managed-configuration);
        max-advertisement-interval seconds;
        min-advertisement-interval seconds;
        (other-stateful-configuration | no-other-stateful-configuration);
        prefix prefix;
        reachable-time milliseconds;
        retransmit-timer milliseconds;
      }
```

```
    }
  }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name*]

Release Information Statement introduced in Junos OS Release 9.2.
[edit dynamic-profiles *profile-name* protocols mld] and **[edit dynamic-profiles *profile-name* protocols router-advertisement]** hierarchies added in Junos OS Release 10.1.

Description Enable IGMP on the router. IGMP must be enabled for the router to receive multicast packets.

Default IGMP is disabled on the router. IGMP is automatically enabled on all broadcast interfaces when you configure Protocol Independent Multicast (PIM) or Distance Vector Multicast Routing Protocol (DVMRP).

Options The statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- For general information about configuring IGMP or MLD, see the *Junos OS Multicast Protocols Configuration Guide*.

provisioning-order

Syntax provisioning-order jsrc;

Hierarchy Level [edit access profile *profile-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure AAA to use the specified application for subscriber service provisioning.

Options jsrc—Specify JSRC as the application used to communicate with the SAE for subscriber service provisioning. JSRC is used in an SRC environment to request services from the SAE for an authenticated subscriber. JSRC attempts to activate these services. If successful, JSRC returns an ACK message. If unsuccessful, the subscriber is denied access.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring JSRC on page 251
- Provisioning Subscribers with JSRC on page 254

proxy-arp

Syntax proxy-arp;

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 9.5.

Description For Ethernet interfaces only, configure the router to respond to any ARP request, as long as the router has an active route to the target address of the ARP request.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

proxy-mode

Syntax proxy-mode;

Hierarchy Level [edit forwarding-options dhcp-relay overrides],
[edit forwarding-options dhcp-relay group *group-name* overrides],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay overrides],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay overrides],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* overrides],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay overrides],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* overrides]
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* interface *interface-name* overrides]

Release Information Statement introduced in Junos OS Release 9.5.

Description Enable DHCP relay proxy mode on the extended DHCP relay. Proxy mode supports all extended DHCP relay functionality.

The extended DHCP relay proxy is not supported for the J Series routers DHCP server. Also, you cannot configure both the DHCP relay proxy and the extended DHCP local server on the same interface.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- DHCP Relay Proxy Overview on page 138
- Extended DHCP Relay Agent Overview on page 136
- Enabling DHCP Relay Proxy Mode on page 176

push (Dynamic VLANs)

Syntax push;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **input-vlan-map**]

Release Information Statement introduced in Junos OS Release 10.4.

Description For dynamic VLAN interfaces, specify the VLAN rewrite operation to add a new VLAN tag to the top of the VLAN stack. An outer VLAN tag is pushed in front of the existing VLAN tag. If you include the **push** statement in the configuration, you must also include the pop statement at the **[edit dynamic-profiles** ***profile-name*** **interfaces** ***interface-name*** **unit** ***logical-unit-number*** **output-vlan-map]** hierarchy level.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Stacking and Rewriting VLAN Tags for the Layer 2 Wholesale Solution

qos-adjust

Syntax qos-adjust;

Hierarchy Level [edit protocols **ancp**]

Release Information Statement introduced in Junos OS Release 9.4.

Description Specify that CoS policy for interfaces and interface sets is adjusted according to ANCP protocol messages. Updates QoS adjustments for all subscribers.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring ANCP on page 713
- Configuring ANCP to Adjust CoS Traffic Shaping on page 720

qualified-next-hop

Syntax

```
qualified-next-hop interface-name {
    mac-address address;
}
```

Hierarchy Level [edit dynamic-profiles routing-options **access-internal route** *subscriber-ip-address*]

Release Information Statement introduced in Junos OS Release 9.5.

Description Dynamically configure the qualified next-hop and the MAC address for an access-internal route for DHCP and PPP subscriber interfaces.

Options

interface-name—Either the specific interface you want to assign to the access route or the variable, or the **$junos-interface-name** variable. The variable is dynamically replaced with the value supplied by DHCP or PPP when a subscriber logs in.

The remaining statement is explained separately.

Required Privilege Level

routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 187

radius (Access Profile)

Syntax

```
radius {
    accounting-server [ ip-address ];
    attributes {
        exclude
            accounting-authentic [ accounting-on | accounting-off ];
            accounting-delay-time [ accounting-on | accounting-off ];
            accounting-session-id [ access-request | accounting-on | accounting-off |
                accounting-stop ];
            accounting-terminate-cause [ accounting-off ];
            called-station-id [ access-request | accounting-start | accounting-stop ];
            calling-station-id [ access-request | accounting-start | accounting-stop ];
            class [ accounting-start | accounting-stop ];
            dhcp-gi-address [ access-request | accounting-start | accounting-stop ];
            dhcp-mac-address [ access-request | accounting-start | accounting-stop ];
            output-filter [ accounting-start | accounting-stop ];
            event-timestamp [ accounting-on | accounting-off | accounting-start | accounting-stop
                ];
            framed-ip-address [ accounting-start | accounting-stop ];
            framed-ip-netmask [ accounting-start | accounting-stop ];
            input-filter [ accounting-start | accounting-stop ];
            input-gigapackets [ accounting-stop ];
            input-gigawords [ accounting-stop ];
            interface-description [ access-request | accounting-start | accounting-stop ];
            nas-identifier [ access-request | accounting-on | accounting-off | accounting-start |
                accounting-stop ];
            nas-port [ access-request | accounting-start | accounting-stop ];
            nas-port-id [ access-request | accounting-start | accounting-stop ];
            nas-port-type [ access-request | accounting-start | accounting-stop ];
            output-gigapackets [ accounting-stop ];
            output-gigawords [ accounting-stop ];
        }
        ignore {
            framed-ip-netmask;
            input-filter;
            logical-system-routing-instance;
            output-filter;
        }
    }
    authentication-server [ ip-address ];
    options {
        accounting-session-id-format (decimal | description);
        client-accounting-algorithm (direct | round-robin);
        client-authentication-algorithm (direct | round-robin);
        ethernet-port-type-virtual;
        interface-description-format {
            exclude-adapter;
            exclude-sub-interface;
        }
        nas-identifier identifier-value;
        nas-port-extended-format {
            adapter-width width;
            port-width width;
```

```
        slot-width width;
        stacked-vlan-width width;
        vlan-width width;
      }
      revert-interval interval;
      vlan-nas-port-stacked-format;
    }
}
```

Hierarchy Level [edit access profile *profile-name*]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Configure the RADIUS parameters that the router uses for AAA authentication and accounting for subscribers.

The statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring RADIUS Server Parameters for Subscriber Access on page 26
- RADIUS Server Options for Subscriber Access on page 27

radius (Dynamic Profiles)

Syntax

```
radius {
  vendor-id id {
    attribute attribute-number;
    tag tag-number;
    }
  }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* variables]

Release Information Statement introduced in Junos OS Release 9.3.

Description Configure RADIUS attribute variables in a dynamic profile.

The 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 User-Defined CoS Variables in a Dynamic Service Profile on page 630

radius-disconnect (DHCP Local Server)

Syntax radius-disconnect;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server reconfigure **trigger**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 reconfigure **trigger**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* reconfigure **trigger**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* reconfigure **trigger**],
[edit logical-systems *logical-system-name* system services dhcp-local-server reconfigure **trigger**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 reconfigure **trigger**],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* reconfigure **trigger**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* reconfigure **trigger**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server reconfigure **trigger**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 reconfigure **trigger**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* reconfigure **trigger**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* reconfigure **trigger**],
[edit system services dhcp-local-server reconfigure **trigger**],
[edit system services dhcp-local-server dhcpv6 reconfigure **trigger**],
[edit system services dhcp-local-server group *group-name* reconfigure **trigger**],
[edit system services dhcp-local-server dhcpv6 group *group-name* reconfigure **trigger**]

Release Information Statement introduced in Junos OS Release 10.0.
The **[edit ... dhcpv6 ...]** hierarchies added in Junos OS Release 10.4.

Description Configure all DHCP clients or only the DHCP clients serviced by the specified group of interfaces to be reconfigured when a RADIUS-initiated disconnect is received by the DHCP client or group of clients. A group configuration takes precedence over a DHCP local server configuration.

Default The client is deleted when a RADIUS-initiated disconnect is received.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 117
- Configuring Reconfiguration of the Client on Receipt of RADIUS-Initiated Disconnect on page 119

radius-flow-tap

Syntax

```
radius-flow-tap {
    forwarding-class class-name;
    interfaces interface-name;
    source-ipv4-address ipv4-address;
)
```

Hierarchy Level [edit services]

Release Information Statement introduced in Junos OS Release 9.4.

Description Assign parameters that are used with subscriber secure policy mirroring.

The remaining statements are explained separately.

Required Privilege Level flow-tap—To view this statement in the configuration.
flow-tap-control—To add this statement to the configuration.

Related Documentation

- Subscriber Secure Policy Overview on page 557
- Configuring RADIUS-Flow-Tap Service Support for Subscriber Secure Policy Mirroring on page 564

radius-server

Syntax

```
radius-server server-address {
    accounting-port port-number;
    port port-number;
    retry attempts;
    routing-instance routing-instance-name;
    secret password;
    source-address source-address;
    timeout seconds;
}
```

Hierarchy Level

[edit access],
[edit access **profile** *profile-name*]

Release Information

Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description

Configure RADIUS for subscriber access management, L2TP, or PPP.

To configure multiple RADIUS servers, include multiple **radius-server** statements. The servers are tried in order and in a round-robin fashion until a valid response is received from one of the servers or until all the configured retry limits are reached.

Options

server-address—Address of the RADIUS authentication server.

The remaining statements are explained separately.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring RADIUS Authentication for L2TP
- Configuring the PPP Authentication Protocol
- Configuring RADIUS Authentication
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

range (Address-Assignment Pools)

Syntax

```
range range-name {
    high upper-limit;
    low lower-limit;
    prefix-length prefix-length;
}
```

Hierarchy Level [edit access address-assignment **pool** *pool-name* **family** (inet | inet6)]

Release Information Statement introduced in Junos OS Release 9.0.
IPv6 support introduced in Junos OS Release 10.0.

Description Configure a named range of IPv4 addresses or IPv6 prefixes, used within an address-assignment pool.

Options

high ***upper-limit***—Upper limit of an address range or IPv6 prefix range.

low ***lower-limit***—Lower limit of an address range or IPv6 prefix range.

prefix-length ***prefix-length***—Assigned length of the IPv6 prefix.

range-name—Name assigned to the range of IPv4 addresses or IPv6 prefixes.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56

reachable-time (Dynamic Router Advertisement)

Syntax reachable-time *milliseconds*;

Hierarchy Level [edit protocols router-advertisement interface *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Set the length of time that a node considers a neighbor reachable until another reachability confirmation is received from that neighbor.

Options ***milliseconds***—Reachability time limit.
Range: 0 through 3,600,000 milliseconds
Default: 0 milliseconds

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring the Delay Before Neighbor-Discovery Neighbors Mark the Router as Down

realm

Syntax realm *realm-name*;

Hierarchy Level [edit diameter origin]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify the realm of the host that originates the Diameter message.

Options ***realm-name***—Name of the message origin realm. Supplied as the value of Origin-Realm AVP for all messages sent by the Diameter master instance.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Diameter on page 233
- Configuring the Origin Attributes of the Diameter Instance on page 234

reconfigure (DHCP Local Server)

Syntax

```
reconfigure {
    attempts attempt-count;
    clear-on-abort;
    strict;
    timeout timeout-value;
    token token-value;
    trigger {
        radius-disconnect;
    }
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server** dhcpv6],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name*],
[edit logical-systems *logical-system-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server** dhcpv6],
[edit logical-systems *logical-system-name* system services dhcp-local-server **group** *group-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 **group** *group-name*],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server** dhcpv6],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name*],
[edit system services **dhcp-local-server**],
[edit system services **dhcp-local-server** dhcpv6],
[edit system services dhcp-local-server **group** *group-name*],
[edit system services dhcp-local-server dhcpv6 **group** *group-name*]

Release Information

Statement introduced in Junos OS Release 10.0.
The **[edit ... dhcpv6 ...]** hierarchies added in Junos OS Release 10.4.

Description

Enable dynamic reconfiguration triggered by the DHCP local server of all DHCP clients or only the DHCP clients serviced by the specified group of interfaces. A group configuration takes precedence over a DHCP local server configuration. The **strict** statement is available only for DHCPv6.

The remaining statements are explained separately.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 117

registration-lifetime

Syntax registration-lifetime *seconds*;

Hierarchy Level [edit logical-systems *logical-system-name* services **mobile-ip home-agent virtual-network home-agent-address** *ip-address*],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip home-agent virtual-network home-agent-address** *ip-address*],
[edit routing-instances *routing-instances-name* services **mobile-ip home-agent virtual-network home-agent-address** *ip-address*],
[edit services **mobile-ip home-agent virtual-network home-agent-address** *ip-address*]

Release Information Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services mobile-ip home-agent virtual-network home-agent-address *ip-address*]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip home-agent virtual-network home-agent-address *ip-address*]**, and **[edit routing-instances *routing-instances-name* services mobile-ip home-agent virtual-network home-agent-address *ip-address*]** hierarchy levels added in Junos OS Release 9.5.

Description Configure maximum period for registration lifetime that is accepted by the Mobile IP home agent.

Options **registration-lifetime *seconds***—Maximum lifetime that the home agent accepts in any registration request. The registration lifetime is not affected if you change the system clock.

Range: 7 through 65535 seconds

Default: 3600 seconds

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Mobile IP on page 315
- Configuring the Mobile IP Home Agent on page 319

relay-agent-interface-id

Syntax relay-agent-interface-id;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**],
[edit system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify that the DHCPv6 Relay Agent Interface-ID option (option 18) in the client PDU name is concatenated with the username during the subscriber authentication process.

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Creating Unique Usernames for DHCP Clients on page 111

relay-agent-remote-id

Syntax relay-agent-remote-id;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**],
[edit system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify that the DHCPv6 Relay Agent Remote-ID option (option 37) in the client PDU name is concatenated with the username during the subscriber authentication process.

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Creating Unique Usernames for DHCP Clients on page 111

relay-agent-subscriber-id

Syntax relay-agent-subscriber-id;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**],
[edit system services dhcp-local-server dhcpv6 authentication **username-include**],
[edit system services dhcp-local-server dhcpv6 group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify that the DHCPv6 Relay Agent Subscriber-ID option (option 38) in the client PDU name is concatenated with the username during the subscriber authentication process.

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Creating Unique Usernames for DHCP Clients on page 111

relay-option-60

Syntax

```
relay-option-60 {
  vendor-option {
    (equals | starts-with) (ascii match-string | hexadecimal match-hex) {
      (relay-server-group server-group-name |
      local-server-group local-server-group-name |
      drop);
    }
    (default-relay-server-group server-group-name |
    default-local-server-group local-server-group-name |
    drop);
  }
}
```

Hierarchy Level

[edit forwarding-options **dhcp-relay**],
[edit forwarding-options dhcp-relay **group** *group-name*],
[edit logical-systems *logical-system-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name*],
[edit routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name*]

Release Information

Statement introduced in Junos OS Release 9.0.

Description

Configure the extended DHCP relay agent to use the DHCP vendor class identifier option (option 60) in DHCP client packets to forward client traffic to specific DHCP servers, or to drop selected DHCP client packets. This feature is useful in network environments where DHCP clients access services provided by multiple vendors and DHCP servers.

You can use the **relay-option-60** statement and its subordinate statements at the **[edit forwarding-options dhcp-relay]** hierarchy level to configure option 60 support globally, or at the **[edit forwarding-options dhcp-relay group *group-name*]** hierarchy level to configure option 60 support for a named group of interfaces. You can also configure option 60 support for the extended DHCP relay agent on a per logical system and per routing instance basis.

The 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

- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 169

relay-option-82

Syntax

```
relay-option-82 {
  circuit-id {
    prefix prefix;
    use-interface-description (logical | device);
  }
}
```

Hierarchy Level

[edit forwarding-options **dhcp-relay**],
[edit forwarding-options dhcp-relay **group** *group-name*],
[edit logical-systems *logical-system-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **group** *group-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name*],
[edit routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name*]

Release Information

Statement introduced in Junos OS Release 8.3.

Description

Enable or disable the insertion of the DHCP relay agent information option (option 82) in DHCP packets destined for a DHCP server.

If you enable insertion of option 82 information in DHCP packets, you must specify at least the **circuit-id** statement to include the Agent Circuit ID suboption (suboption 1) of the DHCP relay agent information option.

You can use the **relay-option-82** statement and its subordinate statements at the **[edit forwarding-options dhcp-relay]** hierarchy level to control insertion of option 82 information globally, or at the **[edit forwarding-options dhcp-relay group *group-name*]** hierarchy level to control insertion of option 82 information for a named group of interfaces.

To restore the default behavior (option 82 information is not inserted into DHCP packets), use the **delete relay-option-82** statement.

The 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

- Enabling and Disabling Insertion of Option 82 Information on page 172

relay-server-group

Syntax relay-server-group *server-group-name*;

Hierarchy Level
[edit forwarding-options dhcp-relay relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit forwarding-options dhcp-relay group *group-name* relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-60 **vendor-option** (equals | starts-with) (ascii *match-string* | hexadecimal *match-hex*)]

Release Information Statement introduced in Junos OS Release 9.0.

Description Relay DHCP client packets to the specified group of extended DHCP relay servers when you use the DHCP vendor class identifier option (option 60) in DHCP packets to forward client traffic to specific DHCP servers.

If the option 60 string received in the DHCP client packet matches the ASCII or hexadecimal match string and match criteria (exact match or partial match) that you specify, the extended DHCP relay agent relays the client packets to the specified group of servers configured with the **server-group** statement at the **[edit forwarding-options dhcp-relay]** hierarchy level. A server group can contain multiple server addresses and can map to more than one ASCII or hexadecimal match string.

Options ***server-group-name***—Name of the extended DHCP relay server group.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 169

remote-gateway (Tunnel Profile)

Syntax

```
remote-gateway {
    address server-ip-address;
    gateway-name server-name;
}
```

Hierarchy Level [edit access tunnel-profile *profile-name* tunnel *tunnel-id*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the IP address and hostname of the remote gateway at the L2TP tunnel endpoint, the LNS.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring a Tunnel Profile for Subscriber Access on page 219

remote-id

Syntax remote-id *value* range *named-range*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes option-match option-82]

Release Information Statement introduced in Junos OS Release 9.0.

Description Specify the address-assignment pool named range to use based on the particular option 82 Agent Remote ID value.

Options range *named-range*—Name of the address-assignment pool range to use.

value—The string for Agent Remote ID suboption (suboption 2) of the DHCP relay agent information option (option 82) in DHCP packets.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Address-Assignment Pools on page 56

replace-ip-source-with

Syntax replace-ip-source-with giaddr;

Hierarchy Level
[edit forwarding-options dhcp-relay **overrides**],
[edit forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**]
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* interface *interface-name* **overrides**]

Release Information Statement introduced in Junos OS Release 9.6.

Description Replace the IP source address in DHCP relay request and release packets with the gateway IP address (giaddr).

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Extended DHCP Relay Agent Overview on page 136
- Replacing the DHCP Relay Request and Release Packet Source Address on page 152

replay-method

Syntax replay-method (none | timestamp *seconds*);

Hierarchy Level
[edit logical-systems *logical-system-name* services **mobile-ip peer** ip-address *address* **spi** *hexadecimal-value*].
[edit logical-systems *logical-system-name* services **mobile-ip peer** *nai*@*domain* **spi** *hexadecimal-value*].
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip peer** ip-address *address* **spi** *hexadecimal-value*].
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip peer** *nai*@*domain* **spi** *hexadecimal-value*].
[edit routing-instances *routing-instances-name* services **mobile-ip peer** ip-address *address* **spi** *hexadecimal-value*].
[edit routing-instances *routing-instances-name* services **mobile-ip peer** *nai*@*domain* **spi** *hexadecimal-value*],
[edit services **mobile-ip peer** ip-address *address* **spi** *hexadecimal-value*],
[edit services **mobile-ip peer** *nai*@*domain* **spi** *hexadecimal-value*]

Release Information Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services mobile-ip peer ip-address *address* spi *hexadecimal-value*]**, **[edit logical-systems *logical-system-name* services mobile-ip peer *nai*@*domain* spi *hexadecimal-value*]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip peer ip-address *address* spi *hexadecimal-value*]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip peer *nai*@*domain* spi *hexadecimal-value*]**, **[edit routing-instances *routing-instances-name* services mobile-ip peer ip-address *address* spi *hexadecimal-value*]**, and **[edit routing-instances *routing-instances-name* services mobile-ip peer *nai*@*domain* spi *hexadecimal-value*]** hierarchy levels added in Junos OS Release 9.5.

Description Configure the replay protection method. The Identification field enables the home agent to verify that a registration message has been recently generated by the mobile node, rather than replayed by an attacker from a previous registration. You can specify a timestamp tolerance for the mobile node, which causes the request to be rejected if the tolerance is exceeded, or you can specify that the tolerance be taken from the value configured on the home agent.

Default If you do not configure the replay protection method, then the timestamp tolerance is taken from the home agent by default.

Options **none**—Timestamp tolerance is obtained from the setting configured for the home agent

timestamp *seconds*—Tolerance time in which a registration request timestamp and the local time of the home agent can differ.

Range: 1 through 255 seconds

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Mobile IP on page 315
- Configuring the Mobile IP Home Agent on page 319

retransmit-timer (Dynamic Router Advertisement)

Syntax retransmit-timer *milliseconds*;

Hierarchy Level [edit protocols router-advertisement interface *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Set the retransmission frequency of neighbor solicitation messages.

Options ***milliseconds***—Retransmission frequency.
Default: 0 milliseconds

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring the Frequency of Neighbor Solicitation Messages

retry

Syntax retry *attempts*;

Hierarchy Level [edit access **radius-server** *server-address*],
[edit access profile *profile-name* **radius-server** *server-address*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify the number of times that the router or switch is allowed to attempt to contact a RADIUS authentication or accounting server.

Options ***attempts***—Number of times that the router is allowed to attempt to contact a RADIUS server.

Range: 1 through 10

Default: 3

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
- Configuring Router or Switch Interaction with RADIUS Servers on page 19
- Example: Configuring CHAP Authentication with RADIUS
- Configuring RADIUS Authentication for L2TP
- **timeout on page 1116**

revert-interval

Syntax revert-interval *interval*;

Hierarchy Level [edit access profile *profile-name* radius **options**]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Configure the amount of time the router or switch waits after a server has become unreachable. The router or switch rechecks the connection to the server when the specified interval expires. If the server is then reachable, it is used in accordance with the order of the server list.

Options ***interval***—Amount of time to wait.

Range: 0 through 4294967295 seconds

Default: 60 seconds

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring RADIUS Server Options for Subscriber Access on page 29
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

revocation-required

Syntax revocation-required;

Hierarchy Level [edit logical-systems *logical-system-name* services **home-agent virtual-network home-agent-address** *ip-address*],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **home-agent virtual-network home-agent-address** *ip-address*],
[edit routing-instances *routing-instances-name* services **home-agent virtual-network home-agent-address** *ip-address*],
[edit services **mobile-ip home-agent virtual-network home-agent-address** *ip-address*]

Release Information Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services home-agent virtual-network home-agent-address *ip-address*]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services home-agent virtual-network home-agent-address *ip-address*]**, and **[edit routing-instances *routing-instances-name* services home-agent virtual-network home-agent-address *ip-address*]** hierarchy levels added in Junos OS Release 9.5.

Description Configure the Mobile IP home agent to accept registration revocation requests only when the request includes the revocation extension.

Default The Mobile IP home agent supports registration revocation requests that include the revocation extension, but it does not require the extension.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Mobile IP on page 315
- Configuring the Mobile IP Home Agent on page 319

rewrite-rules (Dynamic CoS Interfaces)

Syntax

```
rewrite-rules {
  dscp (rewrite-name | default);
  dscp-ipv6 (rewrite-name | default);
  ieee-802.1 (rewrite-name | default) vlan-tag (outer | outer-and-inner);
  inet-precedence (rewrite-name | default);
  }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Associate a rewrite-rules configuration or default mapping with a specific interface in a dynamic profile.

Options

rewrite-name—Name of a **rewrite-rules** mapping configured at the **[edit class-of-service rewrite-rules]** hierarchy level.

default—The default mapping.

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

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- rewrite-rules

route (Access)

Syntax

```
route prefix {
  next-hop next-hop;
  metric route-cost;
  preference route-distance;
  tag route-tag;
}
```

Hierarchy Level [edit dynamic-profiles routing-options access]

Release Information Statement introduced in Junos OS Release 9.5.

Description Dynamically configure the parameters for access routes.

Options *prefix*—Either the specific route prefix that you want to assign to the access route or one of the following route prefix variables.

- For IPv4 access routes, use the variable, **$junos-framed-route-ip-address-prefix**. The route prefix variable is dynamically replaced with the value in Framed-Route RADIUS attribute [22].
- For IPv6 access routes, use the variable, **$junos-framed-route-ipv6-address-prefix**. The variable is dynamically replaced with the value in Framed-IPv6-Route RADIUS attribute [99].

NOTE: The metric and preference statements are not supported when you specify the IPv6 route prefix variable.

The remaining statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring Dynamic Access Routes for Subscriber Management on page 186

route (Access-Internal)

Syntax

```
route subscriber-ip-address {
  qualified-next-hop underlying-interface {
    mac-address address;
  }
}
```

Hierarchy Level [edit dynamic-profiles routing-options access-internal]

Release Information Statement introduced in Junos OS Release 9.5.

Description Dynamically configure parameters for an access-internal route.

Options *subscriber-ip-address*—Either the specific IP address you want to assign to the access-internal route or the subscriber IP address variable ($junos-subscriber-ip-address). The subscriber IP address variable is dynamically replaced with the value supplied by DHCP or PPP when a subscriber logs in.

The remaining statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 187
- Configuring Dynamic Access-Internal Routes for PPP Subscriber Management on page 202

route (Diameter Base Protocol)

Syntax

```
route dne-route-name {
  destination realm realm-name <host hostname>;
  function function-name <partition partition-name>;
  metric route-metric;
}
```

Hierarchy Level [edit diameter network-element *element-name* forwarding]

Release Information Statement introduced in Junos OS Release 9.6.

Description Define a route reachable through the Diameter network element by associating a metric with a combination of destination and function partition.

The remaining statements are explained separately.

Options ***dne-route-name***—Route name defined for the Diameter network element.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Diameter on page 233
- Configuring Diameter Network Elements on page 235

router (Address-Assignment Pools)

Syntax router [*router-address*];

Hierarchy Level [edit access address-assignment pool *pool-name* family inet dhcp-attributes]

Release Information Statement introduced in Junos OS Release 9.0.

Description Specify one or more routers located on the client's subnet. This statement is the equivalent of DHCP option 3.

Options ***router-address***—IP address of one or more routers.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Address-Assignment Pools on page 56

router-advertisement (Dynamic Profiles)

Syntax router-advertisement {...}

Hierarchy Level [edit dynamic-profiles protocols]

Release Information Statement introduced in Junos OS Release 10.1.

Description Enable router advertisement.

The remaining statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring an Interface to Send Neighbor Discovery Advertisements

routing-instance

Syntax routing-instance *routing-instance-name*;

Hierarchy Level [edit access **radius-server** *server-address*],
[edit access profile *profile-name* **radius-server** *server-address*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure the routing instance used to send RADIUS packets to the RADIUS server.

Options ***routing-instance-name***—Routing instance name.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring the PPP Authentication Protocol
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

routing-instance (Diameter Base Protocol)

Syntax routing-instance *routing-instance-name* ;

Hierarchy Level [edit **diameter peer** *peer-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify a routing instance for a Diameter peer. Alternatively, you can include the **logical-system** statement at the **[edit diameter peer *peer-name*]** hierarchy level to configure a logical and routing instance.

Default By default, the master routing instance is used.

Options ***routing-instance-name***—Name of the routing instance.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Diameter on page 233
- Configuring Diameter Peers on page 234

routing-instance (Tunnel Profile)

Syntax routing-instance *routing-instance-name*;

Hierarchy Level [edit access tunnel-profile *profile-name* **tunnel** *tunnel-id*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify a routing instance for a tunnel.

Options ***routing-instance-name***—Name of the routing instance.
Default: By default, the routing instance *default* is used.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring a Tunnel Profile for Subscriber Access on page 219

routing-instance (PPPoE Service Name Tables)

Syntax routing-instance *routing-instance-name*;

Hierarchy Level [edit protocols pppoe service-name-tables *table-name* service *service-name*],
[edit protocols pppoe service-name-tables *table-name* service *service-name* agent-specifier aci *circuit-id-string* ari *remote-id-string*]

Release Information Statement introduced in Junos OS Release 10.2.

Description Use in conjunction with the **dynamic-profile** statement at the same hierarchy levels to specify the routing instance in which to instantiate a dynamic PPPoE interface. You can associate a routing instance with a named service entry, **empty** service entry, or **any** service entry configured in a PPPoE service name table, or with an agent circuit identifier/agent remote identifier (ACI/ARI) pair defined for these services.

The routing instance associated with a service entry in a PPPoE service name table overrides the routing instance associated with the PPPoE underlying interface on which the dynamic PPPoE interface is created.

If you include the **routing-instance** statement at the **[edit protocols pppoe service-name-tables *table-name* service *service-name* agent-specifier aci *circuit-id-string* ari *remote-id-string*]** hierarchy level, you cannot also include the **static-interface** statement at this level. The **routing-instance** and **static-interface** statements are mutually exclusive for ACI/ARI pair configurations.

Options *routing-instance-name*—Name of the routing instance in which the router instantiates the dynamic PPPoE interface.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring PPPoE Service Name Tables
- Assigning a Dynamic Profile and Routing Instance to a Service Name or ACI/ARI Pair for Dynamic PPPoE Interface Creation on page 475

routing-instance-name (DHCP Local Server)

Syntax routing-instance-name;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit system services **dhcp-local-server authentication username-include**],
[edit system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit system services dhcp-local-server **group** *group-name* **authentication username-include**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify that the routing instance name be concatenated with the username during the subscriber authentication process. No routing instance name is concatenated if the configuration is in the default routing instance.

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

routing-instance-name (DHCP Relay Agent)

Syntax routing-instance-name;

Hierarchy Level
[edit forwarding-options dhcp-relay authentication **username-include**],
[edit forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify that the routing instance name is concatenated with the username during the subscriber authentication process. No routing instance name is concatenated if the configuration is in the default routing instance.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

routing-instance-name (Static Subscribers)

Syntax routing-instance-name;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* system services static-subscribers authentication **username-include**],
[edit logical-systems *logical-system-name* system services static-subscribers group *group-name* authentication **username-include**],
[edit routing-instances *routing-instances-name* system services static-subscribers authentication **username-include**],
[edit routing-instances *routing-instances-name* system services static-subscribers group *group-name* authentication **username-include**],
[edit system services static-subscribers authentication **username-include**],
[edit system services static-subscribers group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify that the name of the routing instance is included as part of the username created for all static subscribers or for the static subscribers in the specified group. The group version of the statement takes precedence over the global version. The username is also sent to RADIUS in the Access-Request message.

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Subscribers over Static Interfaces on page 259
- Configuring the Static Subscriber Global Username on page 265
- Configuring the Static Subscriber Group Username on page 269

routing-instances

Syntax

```
routing-instances routing-instance-name {
    interface interface-name;
}
```

Hierarchy Level [edit **dynamic-profiles**],

Release Information Statement introduced in Junos OS Release 9.6.

Description Dynamically configure an additional routing entity for a router.

Options ***routing-instance-name***—The routing instance variable ($junos-routing-instance). The routing instance variable is dynamically replaced with the routing instance the accessing client uses when connecting to the router.

The remaining statement is explained separately.

NOTE: Though we do not recommend it, you can also enter a specific name for the routing instance, a maximum of 31 characters.

The **interface** statement is described separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring a Retail Dynamic Profile for use in the DHCP Solution

routing-options (Dynamic Profiles)

Syntax

```
routing-options {
  access {
    route prefix {
      next-hop next-hop;
      metric route-cost;
      preference route-distance;
      tag route-tag;
    }
  }
  access-internal {
    route subscriber-ip-address {
      qualified-next-hop underlying-interface {
        mac-address address;
      }
    }
  }
  multicast {
    interface interface-name {
      no-qos-adjust;
    }
  }
}
```

Hierarchy Level [edit **dynamic-profiles** *profile-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure protocol-independent routing properties in a dynamic profile.

The statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring Dynamic Access Routes for Subscriber Management on page 186
- Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management on page 187

rpf-check (Dynamic Profiles)

Syntax

```
rpf-check {
    mode loose;
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family*],

Release Information Statement introduced in Junos OS Release 9.6.

Description Check whether traffic is arriving on an expected path. You can include this statement with the **inet** protocol family only.

The **mode** 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

- Configuring Unicast RPF

rule

Syntax

```
rule rule-name {
  match-direction (input | output | input-output);
  term term-name {
    from {
      application [junos-http, junos-https, junos-httpproxy];
      destination-address address <except>;
      destination-prefix-list list-name <except>;
    }
    then {
      action;
      action-modfiers;
    }
  }
}
```

Hierarchy Level [edit services captive-portal-content-delivery]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the rule the router uses when applying this service.

Options *rule-name*—Identifier for the collection of terms that constitute this rule.

The remaining statements are explained separately.

Required Privilege Level services—To view this statement in the configuration.
services–control—To add this statement to the configuration.

Related Documentation

- Redirecting HTTP Requests on page 545

rule-set

Syntax

```
rule-set rule-set-name {
    [rule rule-name ];
}
```

Hierarchy Level [edit services captive-portal-content-delivery]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the rule set the router uses when applying this service.

Options ***rule-set-name***—Identifier for the collection of rules that constitute this rule set.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Redirecting HTTP Requests on page 545

scheduler (Dynamic Scheduler Maps)

Syntax scheduler *scheduler-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service scheduler-maps *map-name* forwarding-class *class-name*]

Release Information Statement introduced in Junos OS Release 9.2.

Description Associate a scheduler with a scheduler map in a dynamic profile.

Options ***scheduler-name***—Either the specific name of the scheduler configuration block or the scheduler variable ($junos-cos-scheduler).

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 611
- Dynamic Variables Overview on page 327

scheduler-map (Dynamic Traffic Shaping)

Syntax scheduler-map (*map-name*);

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service traffic-control-profiles** *profile-name*]

Release Information Statement introduced before Junos OS Release 9.3.
The **$junos-cos-scheduler-map** variable added in Junos OS Release 9.4.

Description Associate a scheduler map name with a traffic-control profile in a dynamic profile.

The scheduler map can be defined dynamically (at the **[edit dynamic-profiles** *profile-name* **class-of-service scheduler-maps]** hierarchy level) or statically (at the **[edit class-of-service scheduler-maps]** hierarchy level).

Options *map-name*—Name of the scheduler map or the Junos predefined variable ($junos-cos-scheduler-map). When you specify the variable, the scheduler-map name is obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Traffic Scheduling and Shaping for Subscriber Access on page 609
- **output-traffic-control-profile on page 1005**

scheduler-maps (Dynamic CoS Definition)

Syntax

```
scheduler-maps {
  map-name {
    forwarding-class class-name scheduler scheduler-name;
  }
}
```

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service**]

Release Information Statement introduced in Junos OS Release 9.3.
The [**edit dynamic-profiles** ***profile-name***] hierarchy added in Junos OS Release 9.3.

Description Specify a scheduler map name in a dynamic profile and associate it with the scheduler configuration and forwarding class.

Options ***map-name***—Name of the scheduler map.

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

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 611

schedulers (Dynamic CoS Definition)

Syntax

```
schedulers {
  (scheduler-name) {
    buffer-size (percent percentage | remainder | temporal microseconds |
      $junos-cos-scheduler-bs);
    drop-profile-map loss-priority (any | low | medium-low | medium-high | high) protocol
      (any | non-tcp | tcp) drop-profile (profile-name | predefined-variable);
    excess-priority (low | high | $junos-cos-scheduler-excess-priority);
    excess-rate (percent percentage  | percent $junos-cos-scheduler-excess-rate);
    overhead-accounting (shaping-mode) <bytes (byte-value>;
    priority (priority-level | $junos-cos-scheduler-priority);
    shaping-rate (rate | predefined-variable);
    transmit-rate (rate | percent percentage | remainder | percent percentage
      $junos-cos-scheduler-tx) <exact | rate-limit>;
  }
}
```

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service**]

Release Information Statement introduced in Junos OS Release 9.3.
The **$junos-cos-scheduler** predefined variable added in Junos OS Release 9.4.

Description Specify scheduler name and parameter values in a dynamic profile.

Options ***scheduler-name***—Name of the scheduler to be configured or the Junos predefined variable ($junos-cos-scheduler). The predefined variable is replaced with the scheduler name obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.

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

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 611
- **scheduler on page 1084**

secret

Syntax secret *password*;

Hierarchy Level [edit access profile *profile-name* **radius-server** *server-address*],
[edit access radius-disconnect *client-address*],
[edit access **radius-server** *server-address*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure the password to use with the RADIUS server. The secret password used by the local router or switch must match that used by the server.

Options ***password***—Password to use; it can include spaces if the character string is enclosed in quotation marks.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
- Configuring Router or Switch Interaction with RADIUS Servers on page 19
- Example: Configuring CHAP Authentication with RADIUS
- Configuring RADIUS Authentication for L2TP
- Configuring the RADIUS Disconnect Server for L2TP

secret (Tunnel Profile)

Syntax secret *password*;

Hierarchy Level [edit access tunnel-profile *profile-name* **tunnel** *tunnel-id*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the tunnel password sent to the LNS for authentication.

Options ***password***—Cleartext password.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring a Tunnel Profile for Subscriber Access on page 219

send-release-on-delete (DHCP Relay Agent)

Syntax send-release-on-delete;

Hierarchy Level
[edit forwarding-options dhcp-relay **overrides**],
[edit forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**]
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* interface *interface-name* **overrides**]

Release Information Statement introduced in Junos OS Release 10.2.

Description Send a release message to the DHCP server whenever DHCP relay or relay proxy deletes a client.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Extended DHCP Relay Agent Overview on page 136
- Overriding the Default DHCP Relay Configuration Settings on page 150
- Sending Release Messages When Clients Are Deleted on page 166

server (Dynamic PPPoE)

Syntax server;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces pp0 unit** "$junos-interface-unit" **pppoe-options**]

Release Information Statement introduced in Junos OS Release 10.1.

Description In a dynamic profile, configure the router to act as a PPPoE server, also known as a remote access concentrator, when a PPPoE logical interface is dynamically created.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring a Basic PPPoE Dynamic Profile on page 468
- For information about creating static PPPoE interfaces, see the *Junos OS Network Interfaces Configuration Guide*

server-group

Syntax

```
server-group {
  server-group-name {
    server-ip-address;
  }
}
```

Hierarchy Level

[edit forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit routing-instances *routing-instance-name* forwarding-options **dhcp-relay**]

Release Information

Statement introduced in Junos OS Release 8.3.

Description

Specify the name of a group of DHCP server addresses for use by the extended DHCP relay agent.

Options

server-group-name—Name of the group of DHCP server addresses.

server-ip-address—IP address of the DHCP server belonging to this named server group. You can configure a maximum of five IP addresses per named server group.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Extended DHCP Relay Agent Overview on page 136

server-identifier (Address-Assignment Pools)

Syntax

server-identifier *ipv4-address*;

Hierarchy Level

[edit access address-assignment pool *pool-name* family inet **dhcp-attributes**]

Release Information

Statement introduced in Junos OS Release 10.2.

Description

Specify the IP address that is used as the source address the DHCP server includes in IP packets when communicating with clients. The address is included in the DHCP packet in option 54.

Options

ipv4-address—IP address.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Address-Assignment Pools on page 56

service (Dynamic Service Sets)

Syntax

```
service {
  input {
    service-set service-set-name {
      service-filter filter-name;
    }
    post-service-filter filter-name;
  }
  output {
    service-set service-set-name {
      service-filter filter-name;
    }
  }
}
```

Hierarchy Level

[edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **family** *family*],
[edit **dynamic-profiles** *profile-name* **interfaces** pp0 **unit** "$junos–interface–unit" **family** *family*]

Release Information

Statement introduced in Junos OS Release 9.5.
The **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos–interface–unit" family *family*]** hierarchy added in Junos 10.1.

Description

Define the service sets and filters to be applied to an interface. This statement is not supported for **family inet6**.

Options

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

- Dynamic Service Sets Overview on page 501
- Associating Service Sets to Interfaces in a Dynamic Profile on page 527

service-filter (Dynamic Service Sets)

Syntax service-filter *filter-name*;

Hierarchy Level
[edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **family** *family* **service input service-set** *service-set-name*],
[edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **family** *family* **service output service-set** *service-set-name*],
[edit **dynamic-profiles** *profile-name* **interfaces** pp0 **unit** "$junos-interface-unit" **family** *family* **service input service-set** *service-set-name*],
[edit **dynamic-profiles** *profile-name* **interfaces** pp0 **unit** "$junos-interface-unit" **family** *family* **service output service-set** *service-set-name*]

Release Information Statement introduced in Junos OS Release 9.5.
The **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family* service input service-set *service-set-name*]** hierarchy and **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family* service output service-set *service-set-name*]** hierarchy added in Junos 10.1.

Description Define the filter to be applied to traffic before it is accepted for service processing. Configuration of a service filter is optional; if you include the **service-set** statement without a **service-filter** definition, the router software assumes that the match condition is true and selects the service set for processing automatically. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.

Options ***filter-name***—Identifies the filter to be applied in service processing.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Dynamic Service Sets Overview on page 501
- Associating Service Sets to Interfaces in a Dynamic Profile on page 527

service-set (Dynamic Service Sets)

Syntax

```
service-set service-set-name {
    service-filter filter-name;
}
```

Hierarchy Level

[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* service input],
[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* service output],
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family* service input],
[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family* service output]

Release Information

Statement introduced in Junos OS Release 9.5.
The **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family* service input]** hierarchy and **[edit dynamic-profiles *profile-name* interfaces pp0 unit "$junos-interface-unit" family *family* service output]** hierarchy added in Junos 10.1.

Description

Define one or more service sets in a dynamic profile. Service sets are applied to an interface. If you define multiple service sets, the router software evaluates the filters in the order in which they appear in the configuration. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.

Options

service-set-name—Identifies the service set.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Dynamic Service Sets Overview on page 501
- Associating Service Sets to Interfaces in a Dynamic Profile on page 527

services

Syntax services captive-portal-content-delivery { ... }

Hierarchy Level [edit]

Release Information Statement introduced in Junos OS Release 10.4.

Description Define the service rules to be applied to traffic.

Options **captive-portal-content-delivery**—Identifies the captive portal and content delivery set of the rules statements.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Redirecting HTTP Requests on page 545

shaping-rate (Dynamic Traffic Shaping and Scheduling)

Syntax shaping-rate (*rate* | *predefined-variable*);

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service traffic-control-profiles** *profile-name*]
[edit **dynamic-profiles** *profile-name* **class-of-service schedulers** *scheduler-name*]

Release Information Statement introduced in Junos OS Release 9.2.
The **$junos-cos-shaping-rate** variable for traffic-control profiles added in Junos OS Release 9.4.
The **$junos-cos-scheduler-shaping-rate** variable for schedulers added in Junos OS Release 10.2.

Description Configure a shaping rate for a logical interface or a scheduler. The sum of the shaping rates for all logical interfaces on the physical interface can exceed the physical interface bandwidth. This practice is known as oversubscription of the peak information rate (PIR).

Default The default behavior depends on various factors.

Options *rate*—Peak rate in bits per second (bps). You can specify the value as a complete decimal number or as a decimal number followed by the abbreviation **k** (1000), **m** (1,000,000), or **g** (1,000,000,000).

Range: 1000 through 160,000,000,000 bps

predefined-variable—One of the following Junos predefined variables. The variable is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.

- **$junos-cos-shaping-rate**—Variable for the shaping rate that is specified for the logical interface. Use this variable at the **[edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles *profile-name*]** hierarchy level.
- **$junos-cos-scheduler-shaping-rate**—Variable for the shaping rate that is specified for a scheduler. Use this variable at the **[edit dynamic-profiles *profile-name* class-of-service schedulers *scheduler-name*]** hierarchy level.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Traffic Scheduling and Shaping for Subscriber Access on page 609
- **output-traffic-control-profile on page 1005**

sip-server-address

Syntax sip-server-address *ipv6-address*;

Hierarchy Level [edit access address-assignment pool *pool-name* family *family* **dhcp-attributes**]

Release Information Statement introduced in Junos OS Release 10.0.

Description Specify a SIP outbound proxy server that DHCPv6 local server clients can use. This is equivalent to DHCPv6 option 22. To specify multiple servers, add multiple **sip-server-address** statements in order of preference.

Options ***ipv6-address***—IPv6 address of a SIP outbound proxy server.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56

sip-server-domain-name

Syntax sip-server-domain-name *domain-name*;

Hierarchy Level [edit access address-assignment pool *pool-name* family *family* **dhcp-attributes**]

Release Information Statement introduced in Junos OS Release 10.0.

Description Configure the domain name of the SIP outbound proxy server that DHCPv6 local server clients can use. This is equivalent to DHCPv6 option 21.

Options ***domain-name***—Name of the domain.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Address-Assignment Pools Overview on page 55
- Configuring Address-Assignment Pools on page 56

source (Dynamic IGMP Interface)

Syntax source *source*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **igmp interface** *interface-name* **static**]

Release Information Statement introduced in Junos OS Release 9.2.

Description Specify the IP version 4 (IPv4) unicast address to send data on an interface.

Options ***source***—IPv4 unicast address.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring a Dynamic Profile for Client Access on page 353
- For information about defining an IGMP source, see "Enabling IGMP Static Group Membership" in the *Junos OS Multicast Protocols Configuration Guide*

source (Dynamic MLD Interface)

Syntax
```
source ip-address {
    source-count number;
    source-increment increment;
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **mld interface** *interface-name* **static group** *multicast-group-address*]

Release Information Statement introduced in Junos OS Release 10.1.

Description IP version 6 (IPv6) unicast source address for the multicast group being configured on a dynamic interface.

Options ***ip-address***—One or more IPv6 unicast addresses.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Enabling MLD Static Group Membership

source-address

Syntax source-address *source-address*;

Hierarchy Level [edit access **radius-server** *server-address*],
[edit access profile *profile-name* **radius-server** *server-address*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure a source address for each configured RADIUS server. Each RADIUS request sent to a RADIUS server uses the specified source address.

Options ***source-address***—A valid IPv4 address configured on one of the router or switch interfaces. On M Series routers only, the source address can be an IPv6 address and the UDP source port is 514.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Router or Switch Interaction with RADIUS Servers on page 19
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
- Example: Configuring CHAP Authentication with RADIUS
- Configuring RADIUS Authentication for L2TP

source-count (Dynamic MLD Interface)

Syntax source-count *number*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **mld interface** *interface-name* **static group** *multicast-group-address* **source**]

Release Information Statement introduced in Junos OS Release 10.1.

Description Configure the number of multicast source addresses that should be accepted for each static group created on dynamic interfaces.

Options ***number***—Number of source addresses.

Default: 1

Range: 1 through 1024

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Enabling MLD Static Group Membership

source-gateway (Tunnel Profile)

Syntax

```
source-gateway {
    address client-ip-address;
    gateway-name client-name;
}
```

Hierarchy Level [edit access tunnel-profile *profile-name* **tunnel** *tunnel-id*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the IP address and hostname of the source gateway at the local L2TP tunnel endpoint, the LAC.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring a Tunnel Profile for Subscriber Access on page 219

source-increment (Dynamic MLD Interface)

Syntax source-increment *number*;

Hierarchy Level [edit dynamic-profile *profile-name* protocols **mld interface** *interface-name* **static group** *multicast-group-address* **source**]

Release Information Statement introduced in Junos OS Release 10.1.

Description Configure the number of times the address should be incremented for each static group created on the dynamic interface. The increment is specified in a format similar to an IPv6 address.

Options *increment*—Number of times the source address should be incremented.

Default: ::1

Range: ::1 through ffff:ffff:ffff:ffff:ffff:ffff:ffff:ffff:

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Enabling MLD Static Group Membership

source-ipv4-address

Syntax source-ipv4-address *ipv4-address*;

Hierarchy Level [edit services **radius-flow-tap**]

Release Information Statement introduced in Junos OS Release 9.4.

Description Specify the source IP address used in the IP header that is prepended to mirrored packets sent to a mediation device.

Options ***ipv4-address***—IPv4 address.

Required Privilege Level flow-tap—To view this statement in the configuration.
flow-tap-control—To add this statement to the configuration.

Related Documentation

- Subscriber Secure Policy Overview on page 557
- Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 567

spi

Syntax

```
spi hexadecimal-value {
  algorithm (hmac-md5 | md5);
  entity-type (host | mobility-agent);
  key (hex | ascii) string;
  replay-method (none | timestamp seconds);
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* services **mobile-ip peer** ip-address *address*],
[edit logical-systems *logical-system-name* services **mobile-ip peer nai** *user*@*domain*],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip peer** ip-address *address*],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip peer nai** *user*@*domain*],
[edit routing-instances *routing-instances-name* services **mobile-ip peer** ip-address *address*],
[edit routing-instances *routing-instances-name* services **mobile-ip peer nai** *user*@*domain*],
[edit services **mobile-ip peer** ip-address *address*],
[edit services **mobile-ip peer nai** *user*@*domain*]

Release Information

Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services mobile-ip peer ip-address *address*]**, **[edit logical-systems *logical-system-name* services mobile-ip peer nai *user*@*domain*]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip peer ip-address *address*]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip peer nai *user*@*domain*]**, **[edit routing-instances *routing-instances-name* services mobile-ip peer ip-address *address*]**, and **[edit routing-instances *routing-instances-name* services mobile-ip peer nai *user*@*domain*]** hierarchy levels added in Junos OS Release 9.5.

Description

Define the security parameter index for identifying a security context between a pair of nodes among the contexts available in the Mobility Security Association. The index selects the authentication algorithm and key.

Options

hexadecimal-value—Security parameter index identifier.

Range: 100 to FFFFFFFF

The remaining statements are explained separately.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Mobile IP on page 315
- Configuring the Mobile IP Home Agent on page 319

ssm-map (Dynamic IGMP Interface)

Syntax ssm-map *ssm-map-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **igmp interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 9.2.

Description Apply an SSM map to an IGMP interface.

Options ***ssm-map-name***—Name of SSM map.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Configuring a Dynamic Profile for Client Access on page 353
- For information about configuring SSM maps, see "Source-Specific Multicast Groups Overview" in the *Junos OS Multicast Protocols Configuration Guide*

ssm-map (Dynamic MLD Interface)

Syntax ssm-map *ssm-map-name*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **mld interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Apply an SSM map to a dynamic MLD interface.

Options ***ssm-map-name***—Name of SSM map.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Example: Configuring SSM Mapping

static (Dynamic IGMP Interface)

Syntax

```
static {
   group group;
   group group {
      source source;
   }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* protocols igmp interface *interface-name*]

Release Information Statement introduced in Junos OS Release 9.2.

Description Test multicast forwarding on an interface without a receiver host.

Options The remaining statements are explained separately.

Required Privilege Level routing and trace—To view this statement in the configuration.
routing-control and trace-control—To add this statement to the configuration.

Related Documentation

- Configuring a Dynamic Profile for Client Access on page 353
- For information about testing multicast forwarding without a receiver host, see "Enabling IGMP Static Group Membership" in the *Junos OS Multicast Protocols Configuration Guide*

static (Dynamic MLD Interface)

Syntax

```
static {
  group multicast-group-address {
    exclude;
    group-count number;
    group-increment increment;
    source ip-address {
      source-count number;
      source-increment increment;
    }
  }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **mld interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Test multicast forwarding on an interface.

The remaining statements are explained separately.

Required Privilege Level routing and trace—To view this statement in the configuration.
routing-control and trace-control—To add this statement to the configuration.

Related Documentation

- Enabling MLD Static Group Membership

static-subscribers

Syntax

```
static-subscribers {
  access-profile profile-name;
  authentication {
    password password-string;
    username-include {
      domain-name domain-name;
      interface;
      logical-system-name;
      routing-instance-name;
      user-prefix user-prefix-string;
    }
  }
  dynamic-profile profile-name {
    aggregate-clients (merge | replace);
  }
  group group-name {
    access-profile profile-name;
    authentication {
      password password-string;
      username-include {
        domain-name domain-name;
        interface;
        logical-system-name;
        routing-instance-name;
        user-prefix user-prefix-string;
      }
    }
    dynamic-profile profile-name {
      aggregate-clients (merge | replace);
    }
    interface interface-name <exclude> <upto upto-interface-name>;
  }
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* system services],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services],
[edit routing-instances *routing-instances-name* system services],
[edit system services]

Release Information

Statement introduced in Junos OS Release 9.6.

Description

Configure and associate subscribers with statically configured interfaces for dynamic service provisioning.

The remaining statements are explained separately.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Subscribers over Static Interfaces on page 259

statistics

Syntax statistics (time | volume-time);

Hierarchy Level [edit access profile *profile-name* accounting]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.
volume-time option introduced in Junos OS Release 9.4.

Description Configure the router or switch to collect time statistics, or both volume and time statistics, for the sessions being managed by AAA.

Options **time**—Collect uptime statistics only.

volume-time—Collect both volume and uptime statistics. This option is not available for Mobile IP.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Mobile IP Home Agent Elements and Behavior on page 303
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

strict (DHCP Local Server)

Syntax strict;

Hierarchy Level [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit system services dhcp-local-server dhcpv6 **reconfigure**],
[edit system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify whether the server will not allow a client to bind when the client does not indicate that it will accept reconfigure messages. This feature is available only for DHCPv6.

Default Accept solicit messages from clients that do not support reconfiguration and permit them to bind.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 117
- Preventing Binding of Clients That Do Not Support Reconfigure Messages

strip-domain (Domain Maps)

Syntax strip-domain;

Hierarchy Level [edit access domain **map** *domain-map-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Remove the domain name from the username before continuing with any AAA services specified in a domain map.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Enabling Domain Name Stripping on page 73
- Configuring Domain Name Usage for Domain Maps on page 71

swap (Dynamic VLANs)

Syntax swap;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **input-vlan-map**],
[edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **output-vlan-map**]

Release Information Statement introduced in Junos OS Release 10.4.

Description For dynamic VLAN interfaces, specify the VLAN rewrite operation to replace a VLAN tag. The outer VLAN tag of the frame is overwritten with the user-specified VLAN tag information.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Rewriting the VLAN Tag on Tagged Frames
- Stacking and Rewriting VLAN Tags for the Layer 2 Wholesale Solution

tag (Access)

Syntax tag *route-tag*;

Hierarchy Level [edit dynamic-profiles routing-options **access route** *prefix*]

Release Information Statement introduced in Junos OS Release 10.2.

Description Dynamically configure the tag for an access route.

Options ***route-tag***—Either the specific tag you want to assign to the access route or the tag variable ($junos-framed-route-tag). The tag variable is dynamically replaced with the value in Framed-Route Attribute [22].

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring Dynamic Access Routes for Subscriber Management on page 186

tag (Dynamic Profiles)

Syntax tag *tag-number*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **variables radius vendor-id**]

Release Information Statement introduced in Junos OS Release 9.3.

Description Configure a tag for a RADIUS attribute as a variable in a dynamic profile.

Options ***tag-number***—Tag number for the RADIUS attribute.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring User-Defined CoS Variables in a Dynamic Service Profile on page 630

tag-protocol-id (Dynamic VLANs)

Syntax tag-protocol-id *tpid*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **input-vlan-map**],
[edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **output-vlan-map**]

Release Information Statement introduced in Junos OS Release 10.4.

Description For dynamic VLAN interfaces, configure the outer TPID value. All TPIDs you include in input and output VLAN maps must be among those you specify at the **[edit interfaces** ***interface-name*** **gigether-options ethernet-switch-profile tag-protocol-id [** ***tpids*** **]]** hierarchy level.

Default If the **tag-protocol-id** statement is not configured, the TPID value is 0x8100.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring Inner and Outer TPIDs and VLAN IDs

target-logical-system (Domain Maps)

Syntax

```
target-logical-system logical-system-name {
    target-routing-instance routing-instance-name;
}
```

Hierarchy Level [edit access domain map *domain-map-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Configure a non-default logical system and optionally a non-default routing instance to which a subscriber session is mapped in a domain map.

You use the **target-routing-instance** statement at the **[edit access domain map *domain-map-name*]** hierarchy level to configure a non-default routing instance for the default logical system.

Default The default logical system for the subscriber is used.

Options ***logical-system-name***—Name of the logical system.

The remaining statement is explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Specifying a Target Logical System/Routing Instance in a Domain Map on page 71

target-routing-instance (Domain Maps)

Syntax target-routing-instance *routing-instance-name*;

Hierarchy Level [edit access domain **map** *domain-map-name*],
[edit access domain **map** *domain-map-name* **target-logical-system** *logical-system-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Configure a non-default routing instance for the target logical system to which a subscriber session is mapped in a domain map.

- When configured at the **[edit access domain map *domain-map-name*]** hierarchy level, this statement configures the routing instance used with the default target logical system.
- When configured at the **[edit access domain map *domain-map-name* target-logical-system *logical-system-name*]** hierarchy level, this statement configures the routing instance used with the specified non-default target logical system.

Default The default routing instance is used.

Options *routing-instance-name*—Name of the routing instance.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Specifying a Target Logical System/Routing Instance in a Domain Map on page 71

term

Syntax

```
term term-name {
  from {
    match-conditions;
  }
  then {
    action;
    action-modifiers;
  }
  only-at-create;
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* firewall family *family* **fast-update-filter** *filter-name*]

Release Information Statement introduced in Junos OS Release 9.6.

Description Define terms for fast update filters.

Options

action—(Optional) An action to take if conditions match. If you do not specify an action, the packets that match the conditions in the **from** statement are accepted.

action-modifiers—(Optional) One or more actions to perform on a packet.

from—(Optional) Match packet fields to values. If not included, all packets are considered to match and the actions and action modifiers in the **then** statement are taken.

match-conditions—One or more conditions to make a match.

only-at-create—(Optional) Specifies that the term is added only when the fast update filter is first created. No subsequent changes can be made to the term in the filter. Use this option only for terms that do not include subscriber-specific data in their match conditions, such as common or default terms (for example, counting the default drop packets).

term-name—Name that identifies the term. The name can contain letters, numbers, and hyphens (-), and can be up to 64 characters long. To include spaces in the name, enclose it in quotation marks (“ ”).

then—(Optional) Actions to take on matching packets. If not included and a packet matches all the conditions in the **from** statement, the packet is accepted.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Fast Update Filters on page 513
- Configuring Terms for Fast Update Filters on page 515
- Fast Update Filter Match Conditions on page 516
- Fast Update Filter Actions and Action Modifiers on page 517

term (Captive Portal Content Delivery)

Syntax

```
term term-name {
from {
  application [junos-http, junos-https, junos-httpproxy];
  destination-address address <except>;
  destination-prefix-list list-name <except>;
}
then {
  action;
  action-modfiers;
}
}
```

Hierarchy Level [edit services captive-portal-content-delivery rule *rule-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Define the captive-portal-content-delivery term properties.

Options ***term-name***—Identifier for the 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

- Redirecting HTTP Requests on page 545

tftp-server

Syntax tftp-server *ip-address*;

Hierarchy Level [edit access address-assignment pool *pool-name* family inet **dhcp-attributes**]

Release Information Statement introduced in Junos OS Release 9.0.

Description Specify the Trivial File Transfer Protocol (TFTP) server that the client uses to obtain the client configuration file. This is equivalent to DHCP option 150.

Options ***ip-address***—IP address of the TFTP server.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Address-Assignment Pools on page 56

then

Syntax

```
then {
  action;
  action-modifiers;
}
```

Hierarchy Level [edit **services** captive-portal-content-delivery **rule** *rule-name* **term** *term-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Define the captive-portal-content-delivery term actions. The action modifiers are optional.

Options You can configure one of the following actions:

- **accept**—Accept the packets and all subsequent packets in flows that match the rules.
- **rewrite**—Rewrite the packet and all subsequent packets in flows that match the rules.
- **redirect**—Redirect the packet and all subsequent packets in flows that match the rules.
- **insert**—Insert the packet and all subsequent packets in flows that match the rules.

When you select **rewrite** as the action, you can optionally configure one of the following action modifiers:

- **destination-address** ***address***—Specify the destination address of the packet.
- **destination-address** ***address*** **destination-port** ***port***—Specify the destination address and destination port of the packet.

When you select **redirect** as the action, you can optionally configure the following action modifier:

- ***redirect-url***—Specify the redirect URL of the packet.

When you select **insert** as the action, you can optionally configure the following action modifier:

- ***subscriber-tag***—Specify the subscriber tag of the packet.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Redirecting HTTP Requests on page 545
- *Junos OS Policy Framework Configuration Guide*

timeout (DHCP Local Server)

Syntax timeout *timeout-value*;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **reconfigure**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **reconfigure**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit system services dhcp-local-server **reconfigure**],
[edit system services dhcp-local-server dhcpv6 **reconfigure**],
[edit system services dhcp-local-server group *group-name* **reconfigure**],
[edit system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**]

Release Information Statement introduced in Junos OS Release 10.0.
The **[edit ... dhcpv6 ...]** hierarchies added in Junos OS Release 10.4.

Description Configure the initial value in seconds between attempts to reconfigure all DHCP clients or only the DHCP clients serviced by the specified group of interfaces. Each successive attempts doubles the interval between attempts. For example, if the first value is 2, the first retry is attempted 2 seconds after the first attempt fails. The second retry is attempted 4 seconds after the first retry fails. The third retry is attempted 8 seconds after the second retry fails, and so on. A group configuration takes precedence over a DHCP local server configuration.

Options *timeout-value*—Initial retry timeout value.

Range: 1 through 10 seconds

Default: 2 seconds

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 117
- Configuring Dynamic Reconfiguration Attempts for DHCP Clients on page 118

timeout (RADIUS)

Syntax timeout *seconds*;

Hierarchy Level [edit access **radius-server** *server-address*],
[edit access profile *profile-name* **radius-server** *server-address*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure the amount of time that the local router or switch waits to receive a response from a RADIUS server.

Options ***seconds***—Amount of time to wait.

Range: 1 through 90 seconds

Default: 3 seconds

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Router or Switch Interaction with RADIUS Servers on page 19
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20
- Example: Configuring CHAP Authentication with RADIUS
- Configuring RADIUS Authentication for L2TP

timestamp-tolerance

Syntax timestamp-tolerance *seconds*;

Hierarchy Level [edit logical-systems *logical-system-name* services **mobile-ip home-agent virtual-network home-agent-address** *ip-address*],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip home-agent virtual-network home-agent-address** *ip-address*],
[edit routing-instances *routing-instances-name* services **mobile-ip home-agent virtual-network home-agent-address** *ip-address*],
[edit services **mobile-ip home-agent virtual-network home-agent-address** *ip-address*]

Release Information Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services mobile-ip home-agent virtual-network home-agent-address *ip-address*]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip home-agent virtual-network home-agent-address *ip-address*]**, and **[edit routing-instances *routing-instances-name* services mobile-ip home-agent virtual-network home-agent-address *ip-address*]** hierarchy levels added in Junos OS Release 9.5.

Description Configure the acceptable difference between a registration request timestamp and the local time of the home agent.

Options **timestamp-tolerance *seconds***—Acceptable difference in time between a registration request timestamp and the local time of the home agent.

Range: 1 through 255 seconds

Default: 7 seconds

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Mobile IP on page 315
- Configuring the Mobile IP Home Agent on page 319

token (DHCP Local Server)

Syntax token *token-value*;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **reconfigure**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **reconfigure**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit system services dhcp-local-server **reconfigure**],
[edit system services dhcp-local-server dhcpv6 **reconfigure**],
[edit system services dhcp-local-server group *group-name* **reconfigure**],
[edit system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**]

Release Information Statement introduced in Junos OS Release 10.0.
The **[edit ... dhcpv6 ...]** hierarchies added in Junos OS Release 10.4.

Description Configure a plain-text token for all DHCP clients or only the DHCP clients serviced by the specified group of interfaces. The token enables rudimentary entity authentication to protect against inadvertently instantiated DHCP servers. A null token (empty string) indicates that the configuration token functionality is not enabled. A group configuration takes precedence over a DHCP local server configuration. For more information about tokens, see RFC 3118, *Authentication for DHCP Messages*, section 4.

Options ***token-value***—Plain-text alphanumeric string.

Default: null (empty string)

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 117
- Configuring a Token for DHCP Local Server Authentication on page 120

trace (DHCP Local Server)

Syntax trace;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **interface** *interface-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **interface** *interface-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* **interface** *interface-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* **interface** *interface-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **interface** *interface-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **interface** *interface-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **interface** *interface-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **interface** *interface-name*],
[edit system services dhcp-local-server dhcpv6 group *group-name* **interface** *interface-name*],
[edit system services dhcp-local-server group *group-name* **interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Enable trace operations for a group of interfaces or for a specific interface within a group.

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Tracing Extended DHCP Operations on page 123
- Tracing Extended DHCP Operations for Specific Interfaces on page 127

trace (DHCP Relay Agent)

Syntax trace;

Hierarchy Level [edit forwarding-options dhcp-relay group *group-name* **interface** *interface-name*],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **interface** *interface-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **interface** *interface-name*],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Enable trace operations for a group of interfaces or for a specific interface within a group.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Tracing Extended DHCP Operations on page 123
- Tracing Extended DHCP Operations for Specific Interfaces on page 127

traceoptions (Address-Assignment Pools)

Syntax

```
traceoptions {
  file <filename> <files number> <match regular-expression > <size maximum-file-size>
    <world-readable | no-world-readable>;
  flag flag;
  no-remote-trace;
}
```

Hierarchy Level [edit system processes general-authentication-service]

Release Information Flag for tracing address-assignment pool operations introduced in Junos OS Release 9.0.
option-name option introduced in Junos OS Release 8.3.

Description Configure tracing options.

Options

file *filename*—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory **/var/log**.

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. If you specify a maximum number of files, you also must specify a maximum file size with the **size** option.

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 include the following flags:

- **address-assignment**—All address-assignment events
- **all**—All tracing operations
- **configuration**—Configuration events
- **framework**—Authentication framework events
- **jsrc**—JSRC events
- **ldap**—LDAP authentication events
- **local-authentication**—Local authentication events
- **radius**—RADIUS authentication events

match *regex*—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—Disable remote tracing.

no-world-readable—(Optional) Disable unrestricted file access.

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 also must specify a maximum number of trace files with the **files** option.

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—To view this statement in the configuration.
trace-control—To add this statement to the configuration.

Related Documentation

- Tracing Address-Assignment Pool Processes on page 61

traceoptions (ANCP)

Syntax

```
traceoptions {
  file <filename> <files number> <match regular-expression > <size maximum-file-size>
    <world-readable | no-world-readable>;
  flag flag <disable>;
  level (all | error | info | notice | verbose | warning);
  no-remote-trace;
}
```

Hierarchy Level [edit protocols **ancp**]

Release Information Statement introduced in Junos OS Release 9.4.

Description Define tracing operations for ANCP processes.

Options

file *filename*—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory **/var/log**.

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. If you specify a maximum number of files, you also must specify a maximum file size with the **size** option.

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 include the following flags:

- **all**—Trace all operations.
- **config**—Trace configuration events.
- **general**—Trace general flow.
- **packet**—Trace ANCP packet transmit and receive operations.
- **process**—Trace process internals.
- **protocol**—Trace protocol events.
- **restart**—Trace process restart flow
- **routing-socket**—Trace routing socket events.
- **session**—Trace connection events and flow.
- **startup**—Trace ANCP startup events and flow.
- **subscriber**—Trace subscriber events.
- **timer**—Trace timer processing.

level—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 notice messages about conditions requiring special handling.
- **verbose**—Match verbose messages.
- **warning**—Match verbose messages.

disable—Disable this trace flag.

match ***regex***—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—Disable remote tracing.

no-world-readable—(Optional) Disable unrestricted file access.

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 also must specify a maximum number of trace files with the **files** option.

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—To view this statement in the configuration.
trace-control—To add this statement to the configuration.

Related Documentation

- Configuring ANCP on page 713
- Tracing ANCP Operations on page 714

traceoptions (Captive Portal Content Delivery)

Syntax

```
traceoptions {
  file filename{
    size <size>;
    files numfiles;
  }
  flag configuration;
  flag general;
  flag gres;
  flag rtsock;
  flag statistics;
  flag "all";
}
```

Hierarchy Level [edit services captive-portal-content-delivery]

Release Information Statement introduced in Junos OS Release 10.4.
Support at the **[edit services captive-portal-content-delivery]** hierarchy level.

Description Define tracing operations for captive-portal-content-delivery processes.

Options

file *filename*—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory **/var/log**. Ensure that filenames are unique for each logical system or routing instance in which Mobile IP is configured.

NOTE: Global messages (common to all logical systems and routing instances) are always saved in /var/log/mipd. Messages that are specific to a logical system or routing instance are never saved in /var/log/mipd. If you do not configure a trace filename for a logical system or routing instance, then nothing is traced for that entity.

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 also must specify a maximum number of trace files with the **files** option.

Syntax: **xk** to specify KB, **xm** to specify MB, or **xg** to specify GB

Range: 10 KB through 1 GB

Default: 128 KB

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. If you specify a maximum number of files, you also must specify a maximum file size with the **size** option.

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 include the following flags:

- **all**—Trace all operations.
- **configuration**—Trace home agent state machine operations.
- **general**—Trace general operations.
- **gres**—Trace graceful routing switchover operations.
- **rtsock**—Trace routing socket operations.
- **statistics**—Trace statistics operations.

Required Privilege Level

trace—To view this statement in the configuration.
trace-control—To add this statement to the configuration.

Related Documentation

- Redirecting HTTP Requests on page 545

traceoptions (DHCP Local Server)

Syntax

```
traceoptions {
  file <filename> <files number> <match regular-expression > <size size> <world-readable |
    no-world-readable>;
  flag flag;
  no-remote-trace;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server**],
[edit system services **dhcp-local-server**]

Release Information

Statement introduced in Junos OS Release 9.0.

Description

Define global tracing operations for DHCP local server processes. You use the **trace** statement to configure interface-specific tracing.

Options

file *filename*—Name of the file to receive the output of the tracing operation. By default, the tracing operation uses the file named **jdhcpd** in the directory **/var/log**.

files *number*—(Optional) Maximum number of trace files to create before overwriting the oldest one. If you specify a maximum number of files, you also must specify a maximum file size with the **size** option.

Range: 2 through 1000

Default: 3 files

flag *flag*—Tracing operation to perform. To specify more than one tracing operation, include multiple **flag** statements. See “Configuring the Extended DHCP Tracing Flags” on page 125 for a list of the flags that you can include.

match *regular-expression*—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—Disable remote tracing.

no-world-readable—(Optional) Allow only the user **root** and users who have the Junos **maintenance** permission to access the trace files.

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 also must specify a maximum number of trace files with the **files** option.

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 all users to access the trace files.

Required Privilege Level

trace—To view this statement in the configuration.
trace-control—To add this statement to the configuration.

Related Documentation

- Tracing Extended DHCP Operations on page 123
- Configuring the Extended DHCP Log Filename on page 124
- Configuring the Number and Size of Extended DHCP Log Files on page 124
- Configuring Access to the Extended DHCP Log File on page 125
- Configuring a Regular Expression for Extended DHCP Lines to Be Logged on page 125
- Configuring the Extended DHCP Tracing Flags on page 125

traceoptions (DHCP Relay Agent)

Syntax

```
traceoptions {
  file <filename> <files number> <match regular-expression > <size size> <world-readable
    | no-world-readable>;
  flag flag;
  no-remote-trace;
}
```

Hierarchy Level

[edit forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* forwarding-options **dhcp-relay**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options **dhcp-relay**],
[edit routing-instances *routing-instance-name* forwarding-options **dhcp-relay**]

Release Information

Statement introduced in Junos OS Release 8.5.

Description

Configure global tracing operations for extended DHCP relay agent processes. You use the **trace** statement to configure interface-specific tracing.

Default

If you do not include this statement, no global tracing operations are performed.

Options

file *filename*—Name of the file to receive the output of the tracing operation. By default, the tracing operation uses the file named **jdhcpd** in the directory **/var/log**.

files *number*—(Optional) Maximum number of trace files to create before overwriting the oldest one. If you specify a maximum number of files, you also must specify a maximum file size with the **size** option.

Range: 2 through 1000

Default: 3 files

flag *flag*—Tracing operation to perform. To specify more than one tracing operation, include multiple **flag** statements. See “Configuring the Extended DHCP Tracing Flags” on page 125 for a list of the flags that you can include.

match *regular-expression*—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—Disable remote tracing.

no-world-readable—(Optional) Disable unrestricted file access.

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 also must specify a maximum number of trace files with the **files** option.

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 all users to access the trace files.

Required Privilege Level

trace—To view this statement in the configuration.
trace-control—To add this statement to the configuration.

Related Documentation

- Tracing Extended DHCP Operations on page 123
- Configuring the Extended DHCP Log Filename on page 124
- Configuring the Number and Size of Extended DHCP Log Files on page 124
- Configuring Access to the Extended DHCP Log File on page 125
- Configuring a Regular Expression for Extended DHCP Lines to Be Logged on page 125
- Configuring the Extended DHCP Tracing Flags on page 125

traceoptions (Diameter Base Protocol)

Syntax

```
traceoptions {
  file <filename> <files number> <match regular-expression > <size maximum-file-size>
    <world-readable | no-world-readable>;
  flag flag;
  level (all | error | info | notice | verbose | warning);
  no-remote-trace;
}
```

Hierarchy Level [edit system processes diameter-service]

Release Information Statement introduced in Junos OS Release 9.6.

Description Configure tracing options.

Options

file *filename*—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory **/var/log**.

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. If you specify a maximum number of files, you also must specify a maximum file size with the **size** option.

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 include the following flags:

- **all**—Trace all operations
- **application**—Trace Diameter application interface events
- **configuration**—Trace configuration events
- **daemon**—Trace Diameter daemon level events
- **diameter-instance**—Trace Diameter instance events
- **dne**—Trace Diameter network element events
- **framework**—Trace Diameter framework events
- **memory-management**—Trace memory management events
- **messages**—Trace Diameter messages
- **node**—Trace Diameter node events
- **peer**—Trace Diameter peer events

level—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 notice messages about conditions requiring special handling.
- **verbose**—Match verbose messages.
- **warning**—Match verbose messages.

match *regex*—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—Disable remote tracing.

no-world-readable—(Optional) Disable unrestricted file access.

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 also must specify a maximum number of trace files with the **files** option.

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—To view this statement in the configuration.
trace-control—To add this statement to the configuration.

Related Documentation

- Tracing Diameter Base Protocol Processes on page 236

traceoptions (L2TP)

Syntax

```
traceoptions {
  debug-level level;
  file <filename> <files number> <match regular-expression > <size maximum-file-size>
    <world-readable | no-world-readable>;
  filter {
    protocol name;
    user-name username;
  }
  flag flag;
  interfaces interface-name {
    debug-level severity;
    flag flag;
  }
  level (all | error | info | notice | verbose | warning);
  no-remote-trace;
}
```

Hierarchy Level [edit services l2tp]

Release Information Statement introduced before Junos OS Release 7.4.
Support for L2TP LAC added in Junos OS Release 10.4.

Description Define tracing operations for L2TP processes.

Options **debug-level *level***—Trace level for PPP, L2TP, RADIUS, and UDP; this option does not apply to L2TP LAC on MX Series routers:

- **detail**—Detailed debug information.
- **error**—Error information.
- **packet-dump**—Packet decoding information.

file *filename*—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory **/var/log**.

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. If you specify a maximum number of files, you also must specify a maximum file size with the **size** option.

Range: 2 through 1000

Default: 3 files

filter protocol *name*—Additional filter for the specified protocol; this option does not apply to L2TP LAC on MX Series routers:

- **l2tp**
- **ppp**

- **radius**
- **udp**

filter user-name *name*—Additional filter for the specified username; this option does not apply to L2TP LAC on MX Series routers.

flag ***flag***—Tracing operation to perform. To specify more than one tracing operation, include multiple **flag** statements. You can include the following flags:

- **all**—Trace all operations.
- **configuration**—Trace configuration events.
- **events**—Trace interface events.
- **general**—Trace general flow.
- **gres**—Trace GRES events.
- **init**—Trace daemon initialization.
- **ipc-rx**—Trace IPC receive events.
- **ipc-tx**—Trace IPC transmit events.
- **memory**—Trace memory management code.
- **message**—Trace message processing code.
- **packet-error**—Trace packet error events.
- **parse**—Trace parsing events.
- **protocol**—Trace L2TP events.
- **receive-packets**—Trace received L2TP packets.
- **routing-process**—Trace routing process interactions.
- **routing-socket**—Trace routing socket events.
- **session-db**—Trace session database interactions.
- **states**—Trace state machine events.
- **timer**—Trace timer events.
- **transmit-packets**—Trace transmitted L2TP packets.
- **tunnel**—Trace tunnel events.

interfaces ***interface-name***—Apply L2TP traceoptions to a specific services interface. This option does not apply to L2TP LAC on MX Series routers.

- **debug-level** *level*—Trace level for the interface; this option does not apply to L2TP LAC on MX Series routers:
  - **detail**—Detailed debug information.
  - **error**—Error information.
  - **extensive**—All PIC debug information.
- **flag** *flag*—Tracing operation to perform for the interface. This option does not apply to L2TP LAC on MX Series routers. To specify more than one tracing operation, include multiple **flag** statements. You can include the following flags:
  - **all**—Trace everything.
  - **ipc**—Trace L2TP Inter-Process Communication (IPC) messages between the PIC and the Routing Engine.
  - **packet-dump**—Dump each packet content based on debug level.
  - **protocol**—Trace L2TP, PPP, and multilink handling.
  - **system**—Trace packet processing on the PIC.

level—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 notice messages about conditions requiring special handling.
- **verbose**—Match verbose messages.
- **warning**—Match verbose messages.

disable—Disable this trace flag.

match *regex*—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—Disable remote tracing.

no-world-readable—(Optional) Disable unrestricted file access.

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 also must specify a maximum number of trace files with the **files** option.

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—To view this statement in the configuration.
trace-control—To add this statement to the configuration.

Related Documentation

- For information about configuration for L2TP LAC on MX Series routers, see Configuring an L2TP LAC on page 219
- For information about L2TP LAC tracing on MX Series routers, see Tracing L2TP Operations for Subscriber Access on page 224
- For information about L2TP tracing on M Series routers, see Tracing L2TP Operations

traceoptions (Mobile IP)

Syntax

```
traceoptions {
  file <filename> <files number> <match regular-expression > <size maximum-file-size>
    <world-readable | no-world-readable>;
  flag flag;
  level (all | error | info | notice | verbose | warning);
  no-remote-trace;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* services **mobile-ip**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip**],
[edit routing-instances *routing-instances-name* services **mobile-ip**],
[edit services **mobile-ip**]

Release Information

Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services mobile-ip]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip]**, and **[edit routing-instances *routing-instances-name* services mobile-ip]** hierarchy levels added in Junos OS Release 9.5.

Description

Define tracing operations for Mobile IP processes.

Options

file *filename*—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory **/var/log**. Ensure that filenames are unique for each logical system or routing instance in which Mobile IP is configured.

NOTE: Global messages (common to all logical systems and routing instances) are always saved in /var/log/mipd. Messages that are specific to a logical system or routing instance are never saved in /var/log/mipd. If you do not configure a trace filename for a logical system or routing instance, then nothing is traced for that entity.

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. If you specify a maximum number of files, you also must specify a maximum file size with the **size** option.

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 include the following flags:

- **all**—Trace all operations.

- **authentication**—Trace authentication operations.
- **binding**—Trace bindings.
- **event**—Trace events.
- **ha-fsm**—Trace home agent state machine operations.
- **home-agent**—Trace home agent operations.
- **interface-database**—Trace interface database operations.
- **packet**—Trace packet decoding operations.
- **protocol**—Trace protocol operations.
- **rtsock**—Trace routing socket operations.
- **session-db**—Trace session database events.
- **signal**—Trace signal operations.
- **subscriber**—Trace subscriber events.
- **timer**—Trace timer events.
- **trace**—Trace changes in tracing.
- **tunnel**—Trace tunneling operations.
- **user-interface**—Trace user interface events.

level—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 notice messages about conditions requiring special handling.
- **verbose**—Match verbose messages.
- **warning**—Match verbose messages.

no-remote-trace—Disable remote tracing.

match ***regex***—(Optional) Refine the output to include lines that contain the regular expression.

no-world-readable—(Optional) Disable unrestricted file access.

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 also must specify a maximum number of trace files with the **files** option.

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—To view this statement in the configuration.
trace-control—To add this statement to the configuration.

Related Documentation

- Configuring Mobile IP on page 315
- Tracing Mobile IP Operations on page 316

traceoptions (PTSP)

Syntax

```
traceoptions {
  file <filename> <files number> <match regular-expression > <size maximum-file-size>
    <world-readable | no-world-readable>;
  flag flag <disable>;
  no-remote-trace;
}
```

Hierarchy Level [edit system services **packet-triggered-subscribers**]

Release Information Statement introduced in Junos OS Release 10.2.

Description Define tracing operations for PTSP.

Options

file *filename*—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory **/var/log**.

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. If you specify a maximum number of files, you also must specify a maximum file size with the **size** option.

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 include the following flags:

- **all**—Trace all operations.
- **configuration**—Trace configuration events.
- **general**—Trace general flow.
- **peer**—Trace SRC peer events.
- **pic**—Trace PIC events.
- **rtsock**—Trace routing socket events.
- **session**—Trace session events.

disable—Disable this trace flag.

match *regex*—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—Disable remote tracing.

no-world-readable—(Optional) Disable unrestricted file access.

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 also must specify a maximum number of trace files with the **files** option.

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—To view this statement in the configuration.
trace-control—To add this statement to the configuration.

Related Documentation

- Tracing Packet-Triggered Subscriber Operations on page 285

traceoptions (Static Subscribers)

Syntax

```
traceoptions {
  file <filename> <files number> <match regular-expression > <size maximum-file-size>
    <world-readable | no-world-readable>;
  flag flag <disable>;
  level (all | error | info | notice | verbose | warning);
  no-remote-trace;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* system processes **static-subscribers**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system processes **static-subscribers**],
[edit routing-instances *routing-instances-name* system processes **static-subscribers**],
[edit system processes **static-subscribers**]

Release Information

Statement introduced in Junos OS Release 9.6.

Description

Define tracing operations for static subscriber processes.

Options

file ***filename***—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory **/var/log**.

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. If you specify a maximum number of files, you also must specify a maximum file size with the **size** option.

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 include the following flags:

- **all**—Trace all operations.
- **authentication**—Trace authentication events.
- **configuration**—Trace configuration events.
- **database**—Trace database events.
- **general**—Trace general flow.
- **gres**—Trace GRES events.
- **profile**—Trace dynamic profile events.
- **rtsock**—Trace routing socket events.
- **statistics**—Trace statistics events.
- **subscriber**—Trace subscriber events.

level—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 notice messages about conditions requiring special handling.
- **verbose**—Match verbose messages.
- **warning**—Match verbose messages.

disable—Disable this trace flag.

match ***regex***—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—Disable remote tracing.

no-world-readable—(Optional) Disable unrestricted file access.

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 also must specify a maximum number of trace files with the **files** option.

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—To view this statement in the configuration.
trace-control—To add this statement to the configuration.

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259
- Tracing Static Subscriber Operations on page 261

traffic-control-profiles (Dynamic CoS Definition)

Syntax

```
traffic-control-profiles profile-name {
    delay-buffer-rate (percent percentage | rate);
    excess-rate (percent percentage | proportion value | percent $junos-cos-excess-rate);
    guaranteed-rate (percent percentage | rate);
    overhead-accounting (shaping-mode) <bytes (byte-value>;
    scheduler-map map-name;
    shaping-rate (percent percentage | rate | predefined-variable);
}
```

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service**]

Release Information Statement introduced in Junos OS Release 9.2.

Description Configure traffic shaping and scheduling profiles.

Options ***profile-name***—Name of the traffic-control profile.

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

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Traffic Scheduling and Shaping for Subscriber Access on page 609
- **output-traffic-control-profile on page 1005**

transmit-rate (Dynamic Schedulers)

Syntax transmit-rate (*rate* | percent *percentage* | remainder | percent *percentage* $junos-cos-scheduler-tx) <exact | rate-limit>;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **class-of-service schedulers** *scheduler-name*]

Release Information Statement introduced in Junos OS Release 9.3.
The **$junos-cos-scheduler-tx** predefined variable added in Junos OS Release 9.4.

Description Specify the transmit rate or percentage for a scheduler in a dynamic profile.

Default If you do not include this statement, the default scheduler transmission rate and buffer size percentages for queues 0 through 7 are 95, 0, 0, 5, 0, 0, 0, and 0 percent.

Options ***rate***—Transmission rate, in bps. You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation **k** (1000), **m** (1,000,000), or **g** (1,000,000,000).

Range: 3200 through 160,000,000,000 bps

percent *percentage*—Percentage of transmission capacity. A percentage of zero drops all packets in the queue.

Range: 0 through 100 percent

remainder—Use remaining rate available.

$junos-cos-scheduler-tx—Junos predefined variable that is replaced with the transmission rate obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.

exact—(Optional) Enforce the exact transmission rate. Under sustained congestion, a rate-controlled queue that goes into negative credit fills up and eventually drops packets. Make sure this value never exceeds the rate-controlled amount.

rate-limit—(Optional) Limit the transmission rate to the rate-controlled amount during congestion. In contrast to the **exact** option, when there is no congestion, the scheduler with the **rate-limit** option shares unused bandwidth above the rate-controlled amount.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 611
- **scheduler on page 1084**

trigger (DHCP Local Server)

Syntax

```
trigger {
    radius-disconnect;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **reconfigure**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **reconfigure**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* **reconfigure**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **reconfigure**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**],
[edit system services dhcp-local-server **reconfigure**],
[edit system services dhcp-local-server dhcpv6 **reconfigure**],
[edit system services dhcp-local-server group *group-name* **reconfigure**],
[edit system services dhcp-local-server dhcpv6 group *group-name* **reconfigure**]

Release Information

Statement introduced in Junos OS Release 10.0.
The **[edit ... dhcpv6 ...]** hierarchies added in Junos OS Release 10.4.

Description

Configure behavior in response to a trigger for all DHCP clients or only the DHCP clients serviced by the specified group of interfaces.

The remaining statement is explained separately.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Extended DHCP Local Server Dynamic Client Reconfiguration on page 117
- Configuring Reconfiguration of the Client on Receipt of RADIUS-Initiated Disconnect on page 119
- **radius-disconnect (DHCP Local Server) on page 1050**

trust-option-82

Syntax trust-option-82;

Hierarchy Level
[edit forwarding-options dhcp-relay **overrides**],
[edit forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **overrides**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **overrides**]
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* interface *interface-name* **overrides**]

Release Information Statement introduced in Junos OS Release 8.3.

Description Enable processing of DHCP client packets that have a gateway IP address (giaddr) of 0 (zero) and contain option 82 information. By default, the DHCP relay agent treats such packets as if they originated at an untrusted source, and drops them without further processing.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Extended DHCP Relay Agent Overview on page 136

tunnel (Tunnel Profile)

Syntax

```
tunnel tunnel-id {
  identification name;
  logical-system logical-system-name;
  max-sessions number;
  medium type;
  preference number;
  remote-gateway {
    address server-ip-address;
    gateway-name server-name;
  }
  routing-instance routing-instance-name;
  secret password;
  source-gateway {
    address client-ip-address;
    gateway-name client-name;
  }
  type tunnel-type;
}
```

Hierarchy Level [edit access **tunnel-profile** *profile-name*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Define the attributes of a tunnel for the tunnel profile. You can define up to 31 tunnels for each tunnel profile.

The remaining statements are explained separately.

Options ***tunnel-id***—Unique integer that identifies a tunnel defined within a profile. For a subscriber, RADIUS attributes and VSAs can supply or override the attributes defined here for the tunnel.

Range: 1 through 31

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring a Tunnel Profile for Subscriber Access on page 219

tunnel-profile (Domain Maps)

Syntax tunnel-profile *profile-name*;

Hierarchy Level [edit access domain **map** *domain-map-name*]

Release Information Statement introduced in JUNOS Release 10.4.

Description Tunnel profile that provides definitions for tunnels associated with the domain map.

Options *profile-name*—Name of tunnel profile.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Specifying a Tunnel Profile in a Domain Map on page 74

tunnel-profile (Tunnel Profile)

Syntax

```
tunnel-profile profile-name {
  tunnel tunnel-id {
    identification name;
    logical-system logical-system-name;
    max-sessions number;
    medium type;
    preference number;
    remote-gateway {
      address server-ip-address;
      gateway-name server-name;
    }
    routing-instance routing-instance-name;
    secret password;
    source-gateway {
      address client-ip-address;
      gateway-name client-name;
    }
    type tunnel-type;
  }
}
```

Hierarchy Level [edit access]

Release Information Statement introduced in Junos OS Release 10.4.

Description Define a tunnel profile for subscriber access.

Options ***profile-name***—Unique name that identifies the tunnel profile. The profile can be referenced from within a domain map or by the RADIUS Tunnel-Group VSA [26-64].

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring a Tunnel Profile for Subscriber Access on page 219

type (Tunnel Profile)

Syntax type *tunnel-type*;

Hierarchy Level [edit access tunnel-profile *profile-name* **tunnel** *tunnel-id*]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify the tunnel type (protocol).

Default The default tunnel type is **l2tp**.

Options ***tunnel-type***—Tunnel protocol type. The only value currently available is **l2tp**.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring a Tunnel Profile for Subscriber Access on page 219

underlying-interface (demux0)

Syntax underlying-interface *underlying-interface-name*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces demux0** *interface-name* **unit** unit *logical-unit-number* **demux-options**]

Release Information Statement introduced in Junos OS Release 9.3.
Support for aggregated Ethernet added in Junos OS Release 9.4.

Description Configure the underlying interface on which the demultiplexing (demux) interface is running.

Options ***underlying-interface-name***—Either the specific name of the interface on which the DHCP discover packet arrives or one of the following interface variables:

- **$junos-underlying-interface** when configuring dynamic IP demux interfaces.
- **$junos-interface-ifd-name** when configuring dynamic VLAN demux interfaces.

The variable is used to specify the underlying interface when a new demux interface is dynamically created. The variable is dynamically replaced with the underlying interface that DHCP supplies when the subscriber logs in.

NOTE: Logical demux interfaces are currently supported on Gigabit Ethernet, Fast Ethernet, 10-Gigabit Ethernet, or aggregated Ethernet interfaces.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Static Subscriber Interfaces Using IP Demux Interfaces on page 398
- Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 403
- Configuring Static Subscriber Interfaces Using VLAN Demux Interfaces on page 399
- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 404
- For information about static underlying interfaces, see the *Junos OS Network Interfaces Configuration Guide*

underlying-interface (Dynamic PPPoE)

Syntax underlying-interface *interface-name*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces pp0 unit** "$junos-interface-unit" **pppoe-options**]

Release Information Statement introduced in Junos OS Release 10.1.

Description In a dynamic profile, configure the underlying interface on which the router creates the dynamic PPPoE logical interface.

Options ***interface-name***—In the **underlying-interface** ***interface-name*** statement for dynamic PPPoE logical interfaces, you must use the predefined variable **$junos-underlying-interface** in place of ***interface-name***. The variable is used to specify the name of the underlying interface on which the PPPoE logical interface is dynamically created. When the router creates the dynamic PPPoE interface, the **$junos-underlying-interface** predefined variable is dynamically replaced with the name of the underlying interface supplied by the network when the subscriber logs in.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring a Basic PPPoE Dynamic Profile on page 468
- For information about creating static PPPoE interfaces, see the *Junos OS Network Interfaces Configuration Guide*

unit (Dynamic Demux Interface)

Syntax

```
unit logical-unit-number {
  demux-options {
    underlying-interface interface-name
  }
  family family {
    address address;
    demux-source {
      source-address;
    }
    filter {
      input filter-name;
      output filter-name;
    }
    mac-validate (loose | strict):
    unnumbered-address interface-name preferred-source-address address;
  }
  filter {
    input filter-name;
    output filter-name;
  }
}
vlan-id number;
```

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces demux0]

Release Information Statement introduced in Junos 9.3.

Description Configure a dynamic logical interface on the physical device. You must configure a logical interface to be able to use the physical device.

Options

logical-unit-number—Either the specific unit number of the interface or the unit number variable (**$junos-interface-unit**). The variable is used to specify the unit of the interface when a new demux interface is dynamically created. The static unit number variable is dynamically replaced with the unit number that DHCP supplies when the subscriber logs in.

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 Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles on page 403
- For information about static IP demux interfaces, see the *Junos OS Network Interfaces Configuration Guide*

unit (Dynamic PPPoE)

Syntax

```
unit logical-unit-number {
  keepalives interval seconds;
  no-keepalives;
  pppoe-options {
    underlying-interface interface-name;
    server;
  }
  ppp-options {
    chap;
    pap;
  }
  family inet {
    unnumbered-address interface-name destination address destination-profile
      profile-name;
    address address;
    service {
      input {
        service-set service-set-name {
          service-filter filter-name;
        }
        post-service-filter filter-name;
      }
      output {
        service-set service-set-name {
          service-filter filter-name;
        }
      }
    }
    filter {
      input filter-name {
        precedence precedence;
      }
      output filter-name {
        precedence precedence;
      }
    }
  }
  filter {
    input filter-name;
    output filter-name;
  }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name* interfaces pp0]

Release Information Statement introduced in Junos 10.1.

Description In a dynamic profile, configure a logical unit number for the dynamic PPPoE logical interface. You must configure a logical interface to be able to use the router.

Options

logical-unit-number—In the **unit *logical-unit-number*** statement for dynamic PPPoE logical interfaces, you must use the predefined variable **$junos-interface-unit** in place of ***logical-unit-number***. The variable is used to specify the unit number when the PPPoE logical interface is dynamically created. The **$junos-interface-unit** predefined variable is dynamically replaced with the unit number supplied by the router when the subscriber logs in.

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 a Basic PPPoE Dynamic Profile on page 468
- For information about creating static PPPoE interfaces, see the *Junos OS Network Interfaces Configuration Guide*

unit (Dynamic Traffic Shaping)

Syntax

```
unit logical-unit-number {
  classifiers {
    type (classifier-name | default);
  }
  output-traffic-control-profile profile-name;
  rewrite-rules {
    dscp (rewrite-name | default);
    dscp-ipv6 (rewrite-name | default);
    ieee-802.1 (rewrite-name | default) vlan-tag (outer | outer-and-inner);
    inet-precedence (rewrite-name | default);
    }
  }
}
```

Hierarchy Level

[edit **dynamic-profiles** *profile-name* **class-of-service interfaces** *interface-name*]
[edit **dynamic-profiles** *profile-name* **interfaces interface-set** *interface-set-name* **interface** *interface-name*]

Release Information

Statement introduced in Junos OS Release 9.2.
The **[edit dynamic-profiles *profile-name* class-of-service interfaces interface-set *interface-set-name*]** hierarchy level added in Junos OS Release 10.4.

Description

Configure 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—One of the following options:

- $junos-underlying-interface-unit— For static VLANs, the unit number variable. The static unit number variable is dynamically replaced with the client unit number when the client session begins. The client unit number is specified by the DHCP when it accesses the subscriber network.
- $junos-interface-unit—For dynamic demux and dynamic PPPoE interfaces, the unit number variable. The static unit number variable is dynamically replaced with the client unit number when the client session begins. The client unit number is specified by the DHCP or PPP when it accesses the subscriber network.
- *value*—Specific unit number of the interface you want to assign to the dynamic-profile

Range: 0 through 16385. For demux and PPPoE interfaces, the unit numbers can range from 0 through 1,073,741,823.

The remaining statements are explained separately. The **classifiers**, **output-traffic-control-profile**, and **rewrite-rules** statements are not supported for interface sets.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile on page 617
- Configuring an Interface Set of Subscribers in a Dynamic Profile on page 644

unit (Dynamic Profiles Standard Interface)

Syntax

```
unit logical-unit-number {
  encapsulation (atm-ccc-cell-relay | atm-ccc-vc-mux | atm-cisco-nlpid | atm-tcc-vc-mux
    | atm-mlppp-llc | atm-nlpid | atm-ppp-llc | atm-ppp-vc-mux | atm-snap | atm-tcc-snap
    | atm-vc-mux | ether-over-atm-llc | ether-vpls-over-atm-llc | ether-vpls-over-fr |
    ether-vpls-over-ppp | ethernet | frame-relay-ccc | frame-relay-ppp | frame-relay-tcc |
    frame-relay-ether-type | frame-relay-ether-type-tcc | multilink-frame-relay-end-to-end
    | multilink-ppp | ppp-over-ether | ppp-over-ether-over-atm-llc | vlan-bridge | vlan-ccc |
    vlan-vci-ccc | vlan-tcc | vlan-vpls);
  family family {
    address address;
    filter {
      adf {
        counter;
        input-precedence precedence;
        output-precedence precedence;
        rule rule-value;
      }
      input filter-name (
        precedence precedence;
      }
      output filter-name {
        precedence precedence;
      }
    }
    service {
      input {
        service-set service-set-name {
          service-filter filter-name;
        }
        post-service-filter filter-name;
      }
      input-vlan-map {
        inner-tag-protocol-id tpid;
        inner-vlan-id number;
        (push | swap);
        tag-protocol-id tpid;
        vlan-id number;
      }
      output {
        service-set service-set-name {
          service-filter filter-name;
        }
      }
      output-vlan-map {
        inner-tag-protocol-id tpid;
        inner-vlan-id number;
        (pop | swap);
        tag-protocol-id tpid;
        vlan-id number;
      }
    }
    unnumbered-address interface-name preferred-source-address address;
```

```
    filter {
      input filter-name;
      output filter-name;
    }
    keepalives {
      interval seconds;
      }
    ppp-options {
      chap;
      pap;
    }
    vlan-id number;
    vlan-tags outer [tpid].vlan-id [inner [tpid].vlan-id];
  }
}
```

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces** *interface-name*]

Release Information Statement introduced in Junos OS Release 9.2.

Description Configure 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***—Either the specific unit number of the interface you want to assign to the dynamic profile or the static unit number variable (**$junos-underlying-interface-unit**). The static unit number variable is dynamically replaced with the client unit number when the client session begins. The client unit number is specified by the DHCP client when it accesses the subscriber network.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

unnumbered-address (Dynamic Profiles)

Syntax unnumbered-address *interface-name* **preferred-source-address** *address*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **family** *family*],
[edit **dynamic-profiles** *profile-name* **interfaces demux0 unit** *logical-unit-number* **family** *family*]

Release Information Statement introduced in Junos 9.2.
Support for the **$junos-loopback-interface** predefined variable added in Junos OS Release 9.6.

Description For Ethernet interfaces, enable the local address to be derived from the specified interface. Configuring unnumbered Ethernet interfaces enables IP processing on the interface without assigning an explicit IP address to the interface. To configure unnumbered address dynamically, include the **$junos-loopback-interface-address** predefined variable.

You can configure unnumbered address support on Ethernet interfaces for IPv4 and IPv6 address families.

Options ***interface-name***—Name of the interface from which the local address is derived. Use the **$junos-loopback-interface** dynamic variable to dynamically apply a loopback interface. The loopback interface used is based on the routing instance of the subscriber. The specified interface must have a logical unit number and a configured IP address, and must not be an unnumbered interface.

The **preferred-source-address** 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
- Configuring an Unnumbered Interface
- *Junos Network Interfaces Configuration Guide*

unnumbered-address (Dynamic PPPoE)

Syntax unnumbered-address *interface-name* **destination** *address* **destination-profile** *profile-name*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces pp0 unit** "$junos-interface-unit" **family** inet]

Release Information Statement introduced in Junos OS Release 10.1.

Description For dynamic PPPoE interfaces, enable the local address to be derived from the specified interface. Configuring unnumbered Ethernet interfaces enables IP processing on the interface without assigning an explicit IP address to the interface.

Options ***interface-name***—Interface from which the local address is derived. The interface name must include a logical unit number and must have a configured address.

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 a Basic PPPoE Dynamic Profile on page 468
- For information about creating static PPPoE interfaces, see the *Junos OS Network Interfaces Configuration Guide*

update-interval

Syntax update-interval *minutes*;

Hierarchy Level [edit access profile *profile-name* **accounting**]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Configure the amount of time that the router or switch waits before sending a new accounting update.

Options ***minutes***—Amount of time between updates, in minutes.

Range: 10 through 1440 minutes

Default: No updates

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

use-interface-description

Syntax use-interface-description (logical | device);

Hierarchy Level
[edit forwarding-options dhcp-relay relay-option-82 **circuit-id**],
[edit forwarding-options dhcp-relay group *group-name* relay-option-82 **circuit-id**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay relay-option-82 **circuit-id**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* relay-option-82 **circuit-id**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-82 **circuit-id**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-82 **circuit-id**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay relay-option-82 **circuit-id**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* relay-option-82 **circuit-id**]

Release Information Statement introduced in Junos OS Release 9.6.

Description Use the textual interface description instead of the interface identifier when creating the agent-circuit-id suboption of the DHCP relay agent option 82.

If you specify that the textual description is used and no description is configured for the interface, DHCP relay defaults to using the interface identifier. The textual description is configured using the **description** statement at the **[edit interfaces *interface-name*]** hierarchy level.

NOTE: By default, DHCP relay accepts a maximum of 253 ASCII characters. If the textual interface description is longer than 253 characters, DHCP relay drops the packet, which results in the DHCP client failing to bind.

Options **logical**—Use the textual description that is configured for the logical interface.

device—Use the textual description that is configured for the device interface.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Enabling and Disabling Insertion of Option 82 Information on page 172
- Using a Textual Description in Option 82 on page 175

use-primary (DHCP Local Server)

Syntax use-primary *primary-profile-name*;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dynamic-profile** *profile-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **dynamic-profile** *profile-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server **dynamic-profile** *profile-name*],
[edit logical-systems *logical-system-name* system services dhcp-local-server group *group-name* **dynamic-profile** *profile-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **dynamic-profile** *profile-name*],
[edit routing-instances *routing-instance-name* system services dhcp-local-server group *group-name* **dynamic-profile** *profile-name*],
[edit system services dhcp-local-server **dynamic-profile** *profile-name*]
[edit system services dhcp-local-server group *group-name* **dynamic-profile** *profile-name*]

Release Information Statement introduced in Junos OS Release 9.3.

Description Specify the dynamic profile to configure as the primary dynamic profile. The primary dynamic profile is instantiated when the first subscriber logs in. Subsequent subscribers are not assigned the primary dynamic profile; instead, they are assigned the dynamic profile specified for the interface. When the first subscriber logs out, the next subscriber that logs in is assigned the primary dynamic profile.

Options ***primary-profile-name***—Name of the dynamic profile to configure as the primary dynamic profile

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109

use-primary (DHCP Relay Agent)

Syntax use-primary *primary-profile-name*;

Hierarchy Level
[edit forwarding-options dhcp-relay **dynamic-profile** *profile-name*],
[edit forwarding-options dhcp-relay **group** *group-name* **dynamic-profile** *profile-name*],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **dynamic-profile** *profile-name*],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **group** *group-name* **dynamic-profile** *profile-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **dynamic-profile** *profile-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name* **dynamic-profile** *profile-name*],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **dynamic-profile** *profile-name*],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **group** *group-name* **dynamic-profile** *profile-name*]

Release Information Statement introduced in Junos OS Release 9.3.

Description Specify the dynamic profile to configure as the primary dynamic profile. The primary dynamic profile is instantiated when the first subscriber logs in. Subsequent subscribers are not assigned the primary dynamic profile; instead, they are assigned the dynamic profile specified for the interface. When the first subscriber logs out, the next subscriber that logs in is assigned the primary dynamic profile.

Options ***primary-profile-name***—Name of the dynamic profile to configure as the primary dynamic profile

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Attaching Dynamic Profiles to DHCP Subscriber Interfaces on page 109

user-prefix (DHCP Local Server)

Syntax user-prefix *user-prefix-string*;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server authentication username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication username-include**],
[edit system services **dhcp-local-server authentication username-include**],
[edit system services dhcp-local-server **dhcpv6 authentication username-include**],
[edit system services dhcp-local-server dhcpv6 **group** *group-name* **authentication username-include**],
[edit system services dhcp-local-server **group** *group-name* **authentication username-include**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify the user prefix that is concatenated with the username during the subscriber authentication process.

Options ***user-prefix-string***—The user prefix string.

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

user-prefix (DHCP Relay Agent)

Syntax user-prefix *user-prefix-string*;

Hierarchy Level
[edit forwarding-options dhcp-relay authentication **username-include**],
[edit forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay authentication **username-include**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Specify the user prefix that is concatenated with the username during the subscriber authentication process.

Options ***user-prefix-string***—The user prefix string.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Using External AAA Authentication Services with DHCP on page 96

user-prefix (Static Subscribers)

Syntax user-prefix *user-prefix-string*;

Hierarchy Level
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers authentication **username-include**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers group *group-name* authentication **username-include**],
[edit logical-systems *logical-system-name* system services static-subscribers authentication **username-include**],
[edit logical-systems *logical-system-name* system services static-subscribers group *group-name* authentication **username-include**],
[edit routing-instances *routing-instances-name* system services static-subscribers authentication **username-include**],
[edit routing-instances *routing-instances-name* system services static-subscribers group *group-name* authentication **username-include**],
[edit system services static-subscribers authentication **username-include**],
[edit system services static-subscribers group *group-name* authentication **username-include**]

Release Information Statement introduced in Junos OS Release 9.6.

Description Specify that a string is included as the beginning of the username created for all static subscribers or for the static subscribers in a specified group. The group version of the statement takes precedence over the global version. The username is also sent to RADIUS in the Access-Request message.

Options ***user-prefix-string***—String that begins the username. The string can include the following characters: a through z, A through Z, 0 through 9, "-", or ".".

Required Privilege Level
system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Subscribers over Static Interfaces on page 259
- Configuring the Static Subscriber Global Username on page 265
- Configuring the Static Subscriber Group Username on page 269

username-include (DHCP Local Server)

Syntax

```
username-include {
    circuit-type;
    client-id;
    delimiter delimiter-character;
    domain-name domain-name-string;
    logical-system-name;
    mac-address;
    option-60;
    option-82 <circuit-id> <remote-id>;
    relay-agent-interface-id;
    relay-agent-remote-id;
    relay-agent-subscriber-id;
    routing-instance-name;
    user-prefix user-prefix-string;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication**],
[edit logical-systems *logical-system-name* system services **dhcp-local-server authentication**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **dhcpv6 authentication**],
[edit logical-systems *logical-system-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication**],
[edit logical-systems *logical-system-name* system services dhcp-local-server **group** *group-name* **authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services **dhcp-local-server authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication**],
[edit routing-instances *routing-instance-name* system services **dhcp-local-server authentication**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **dhcpv6 authentication**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server dhcpv6 **group** *group-name* **authentication**],
[edit routing-instances *routing-instance-name* system services dhcp-local-server **group** *group-name* **authentication**],
[edit system services **dhcp-local-server authentication**],
[edit system services dhcp-local-server **dhcpv6 authentication**],
[edit system services dhcp-local-server dhcpv6 **group** *group-name* **authentication**],
[edit system services dhcp-local-server **group** *group-name* **authentication**]

Release Information Statement introduced in Junos OS Release 9.1.

Description Configure the username that the router passes to the external AAA server. You must include at least one of the optional statements for the username to be valid. If you do not configure a username, the router accesses the local authentication service only and does not use external authentication services, such as RADIUS.

The statements are explained separately. The **option-60** and **option-82** statements are not supported in the DHCPv6 hierarchy levels. The **client-id**, **relay-agent-interface-id**, **relay-agent-remote-id** and **relay-agent-subscriber-id** statements are supported in the DHCPv6 hierarchy levels only.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Using External AAA Authentication Services with DHCP on page 96
- Creating Unique Usernames for DHCP Clients on page 111

username-include (DHCP Relay Agent)

Syntax

```
username-include {
  circuit-type;
  delimiter delimiter-character;
  domain-name domain-name-string;
  logical-system-name;
  mac-address;
  option-60;
  option-82 <circuit-id> <remote-id>;
  routing-instance-name;
  user-prefix user-prefix-string;
}
```

Hierarchy Level

[edit forwarding-options dhcp-relay **authentication**],
[edit forwarding-options dhcp-relay group *group-name* **authentication**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **authentication**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **authentication**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **authentication**].
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **authentication**]

Release Information

Statement introduced in Junos OS Release 9.1.

Description

Configure the username that the router passes to the external AAA server. You must include at least one of the optional statements for the username to be valid. If you do not configure a username, the router accesses the local authentication service only and does not use external authentication services, such as RADIUS.

The 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

- Using External AAA Authentication Services with DHCP on page 96

username-include (Static Subscribers)

Syntax

```
username-include {
    domain-name domain-name;
    interface;
    logical-system-name;
    routing-instance-name;
    user-prefix user-prefix-string;
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers **authentication**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* system services static-subscribers group *group-name* **authentication**],
[edit logical-systems *logical-system-name* system services static-subscribers **authentication**],
[edit logical-systems *logical-system-name* system services static-subscribers group *group-name* **authentication**],
[edit routing-instances *routing-instances-name* system services static-subscribers **authentication**],
[edit routing-instances *routing-instances-name* system services static-subscribers group *group-name* **authentication**],
[edit system services static-subscribers **authentication**],
[edit system services static-subscribers group *group-name* **authentication**]

Release Information

Statement introduced in Junos OS Release 9.6.

Description

Specify the information included in the username created for all static subscribers or for static subscribers in a specified group. The group version of the statement takes precedence over the global version. The username is also sent to RADIUS in the Access-Request message.

The remaining statements are explained separately.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Subscribers over Static Interfaces on page 259
- Configuring the Static Subscriber Global Username on page 265
- Configuring the Static Subscriber Group Username on page 269

valid-lifetime (Dynamic Router Advertisement)

Syntax valid-lifetime *seconds*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols router-advertisement interface *interface-name* prefix *prefix*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Specify how long the prefix remains valid for onlink determination.

Options ***seconds***—Valid lifetime, in seconds. If you set the valid lifetime to **0xffffffff**, the lifetime is infinite.

Default: 2,592,000 seconds

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- preferred-lifetime
- Configuring the Prefix Information Included in Neighbor Discovery Advertisements

variables

Syntax

```
variables {
  variable-name {
    mandatory;
    default-value default-value;
    radius {
      vendor-id id {
        attribute attribute-number;
        tag tag-number;
        }
      }
    }
  }
}
```

Hierarchy Level [edit dynamic-profiles *profile-name*]

Release Information Statement introduced in Junos OS Release 9.3.

Description Configure user-defined variables in a dynamic profile. The values that the system uses for these variables are applied when the subscriber authenticates.

Options ***variable-name***—Name of the variable.

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 User-Defined CoS Variables in a Dynamic Service Profile on page 630

vendor-id

Syntax vendor-id *id*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **variables radius**]

Release Information Statement introduced in Junos OS Release 9.3.

Description Configure the vendor ID as a variable in a dynamic profile.

Options *id*—Vendor ID for the RADIUS attribute.

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 User-Defined CoS Variables in a Dynamic Service Profile on page 630

vendor-option

Syntax

```
vendor-option {
  (equals | starts-with) (ascii match-string | hexadecimal match-hex) {
    (relay-server-group server-group-name |
    local-server-group local-server-group-name |
    drop);
  }
  (default-relay-server-group server-group-name |
  default-local-server-group local-server-group-name |
  drop);
}
```

Hierarchy Level

[edit forwarding-options dhcp-relay **relay-option-60**],
[edit forwarding-options dhcp-relay group *group-name* **relay-option-60**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay **relay-option-60**],
[edit logical-systems *logical-system-name* forwarding-options dhcp-relay group *group-name* **relay-option-60**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay **relay-option-60**],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **relay-option-60**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay **relay-option-60**],
[edit routing-instances *routing-instance-name* forwarding-options dhcp-relay group *group-name* **relay-option-60**]

Release Information

Statement introduced in Junos OS Release 9.0.

Description

Configure the match criteria when you use the DHCP vendor class identifier option (option 60) in DHCP client packets to forward client traffic to specific DHCP servers. The extended DHCP relay agent compares the option 60 vendor-specific strings received in DHCP client packets against the match criteria that you specify. If there is a match, you can define certain actions for the associated DHCP client packets.

The **vendor-option** statement enables you to specify either an exact, left-to-right match (with the **equals** statement) or a partial match (with the **starts-with** statement), and configure either an ASCII match string (with the **ascii** statement) or a hexadecimal match string (with the **hexadecimal** statement).

You can configure an unlimited number of match strings. Match strings do not support the use of wildcard attributes.

Options

equals—Exact, left-to-right match of the ASCII or hexadecimal match string with the option 60 string.

starts-with—Partial match of the ASCII or hexadecimal match string with the option 60 string. The option 60 string can contain a superset of the ASCII or hexadecimal match string, provided that the leftmost characters of the option 60 string entirely match the characters in the configured match string. When you use the **starts-with** statement, the longest match rule applies; that is, the router matches the string “test123” before it matches the string “test”.

ascii *match-string*—ASCII match string of 1 through 255 alphanumeric characters.

hexadecimal *match-hex*—Hexadecimal match string of 1 through 255 hexadecimal characters (0 through 9, a through f, A through F).

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
- Using Option 60 Information to Forward Client Traffic to Specific DHCP Servers on page 169

version (Dynamic IGMP Interface)

Syntax version *version*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **igmpinterface** *interface-name*]

Release Information Statement introduced in Junos OS Release 9.2.

Description Specify the version of IGMP.

Options ***version***—IGMP version number.
Range: 1, 2, or 3
Default: IGMP version 2

NOTE: Routers running different versions of IGMP negotiate the lowest common version of IGMP that is supported by hosts on their subnet and operate in that version.

If you have already configured the router to use IGMP version 1 and then configure it to use IGMP version 2, the router continues to use IGMP version 1 for up to 6 minutes and then uses IGMP version 2.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring a Dynamic Profile for Client Access on page 353
- For information about specifying a different IGMP version, see “Changing the IGMP Version” in the *Junos OS Multicast Protocols Configuration Guide*

version (Dynamic MLD Interface)

Syntax version *version*;

Hierarchy Level [edit dynamic-profiles *profile-name* protocols **mld interface** *interface-name*]

Release Information Statement introduced in Junos OS Release 10.1.

Description Configure the MLD version explicitly on the dynamic interface. MLD version 2 (MLDv2) is used only to support source-specific multicast (SSM).

Options ***version***—MLD version to run on the interface.

Range: 1 or 2

Default: 1 (MLDv1)

Required Privilege Level routing and trace—To view this statement in the configuration.
routing-control and trace-control—To add this statement to the configuration.

Related Documentation

- Modifying the MLD Version

virtual-network

Syntax

```
virtual-network {
  home-agent-address ip-address {
    registration-lifetime seconds;
    revocation-required;
    timestamp-tolerance seconds;
  }
}
```

Hierarchy Level

[edit logical-systems *logical-system-name* services **mobile-ip home-agent**],
[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services **mobile-ip home-agent**],
[edit routing-instances *routing-instances-name* services **mobile-ip home-agent**],
[edit services **mobile-ip home-agent**]

Release Information

Statement introduced in Junos OS Release 9.3.
Support at the **[edit logical-systems *logical-system-name* services mobile-ip home-agent]**, **[edit logical-systems *logical-system-name* routing-instances *routing-instances-name* services mobile-ip home-agent]**, and **[edit routing-instances *routing-instances-name* services mobile-ip home-agent]** hierarchy levels added in Junos OS Release 9.5.

Description

Define the virtual network for the Mobile IP home agent. Only one virtual network is supported.

The remaining statements are explained separately.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Configuring Mobile IP on page 315
- Configuring the Mobile IP Home Agent on page 319

vlan-id (Dynamic Profiles)

Syntax vlan-id *number*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number*],

Release Information Statement introduced in Junos OS Release 9.5.
VLAN demux interface support introduced in Junos OS Release 10.2.

Description For VLAN demux, Fast Ethernet, Gigabit Ethernet, and Aggregated Ethernet interfaces only, bind a 802.1Q VLAN tag ID to a logical interface.

Options *number*—A valid VLAN identifier. When used in the **dynamic-profiles** hierarchy, specify the **$junos-vlan-id** predefined variable to dynamically obtain the VLAN identifier.

Range:

- For aggregated Ethernet, 4-port, 8-port, and 12-port Fast Ethernet PICs, and for management and internal Ethernet interfaces, 1 through 1023.
- For 48-port Fast Ethernet and Gigabit Ethernet PICs, 1 through 4094.
- VLAN ID 0 is reserved for tagging the priority of frames.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Static Subscriber Interfaces Using VLAN Demux Interfaces on page 399
- Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles on page 404

vlan-id (Dynamic VLANs)

Syntax vlan-id *number*;

Hierarchy Level [edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **input-vlan-map**],
[edit **dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **output-vlan-map**]

Release Information Statement introduced in Junos OS Release 10.4.

Description For dynamic VLAN interfaces, specify the line VLAN identifiers to be rewritten at the input or output interface.

You cannot include the **vlan-id** statement with the **swap** statement, **swap-push** statement, **push-push** statement, or **push-swap** statement at the **[edit dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number* **output-vlan-map]** hierarchy level. If you include any of those statements in the output VLAN map, the VLAN ID in the outgoing frame is rewritten to the **vlan-id** statement that you include at the **[edit dynamic-profiles** *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number***]** hierarchy level.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Rewriting the VLAN Tag on Tagged Frames
- Binding VLAN IDs to Logical Interfaces

vlan-nas-port-stacked-format

Syntax vlan-nas-port-stacked-format;

Hierarchy Level [edit access profile *profile-name* radius **options**]

Release Information Statement introduced in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Configure RADIUS attribute 5 (NAS-Port) to include the S-VLAN ID, in addition to the VLAN ID, for subscribers on Ethernet interfaces.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring RADIUS Server Options for Subscriber Access on page 29
- Configuring Authentication and Accounting Parameters for Subscriber Access on page 20

vlan-tag (Dynamic Classifiers)

Syntax vlan-tag (inner | outer);

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* classifiers ieee-802.1]

Release Information Statement introduced in Junos OS Release 10.1.

Description Apply this IEEE-802.1 classifier to the inner or outer VLAN tags in a dynamic profile.

Default If you do not include this statement, the classifier applies to the outer VLAN tag only.

Options **inner**—Apply the classifier to the inner VLAN tag only.

outer—Apply the classifier to the outer VLAN tag only.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Applying a Classifier to a Subscriber Interface in a Dynamic Profile on page 618
- classifiers (Definition)

vlan-tag (Dynamic Rewrite Rules)

Syntax vlan-tag (outer | outer-and-inner);

Hierarchy Level [edit dynamic-profiles *profile-name* class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules ieee-802.1]

Release Information Statement introduced in Junos OS Release 10.1.

Description Apply this IEEE-802.1 rewrite rule to the outer or outer and inner VLAN tags in a dynamic profile.

Default If you do not include this statement, the rewrite rule applies to the outer VLAN tag only.

Options **outer**—Apply the rewrite rule to the outer VLAN tag only.

outer-and-inner—Apply the rewrite rule to both the outer and inner VLAN tags.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Guidelines for Configuring Dynamic CoS for Subscriber Access on page 592
- Applying a Rewrite Rule Definition to a Subscriber Interface in a Dynamic Profile on page 617
- rewrite-rules

vlan-tagging

Syntax vlan-tagging;

Hierarchy Level [edit dynamic-profiles *profile-name* **interfaces** *interface-name*],
[edit **interfaces** *interface-name*]

Release Information Statement introduced in Junos OS Release 9.2.

Description For Fast Ethernet and Gigabit Ethernet interfaces and aggregated Ethernet interfaces configured for VPLS, enable the reception and transmission of 802.1Q VLAN-tagged frames on the interface.

NOTE: For Ethernet, Fast Ethernet, Tri-Rate Ethernet copper, Gigabit Ethernet, 10-Gigabit Ethernet, and aggregated Ethernet interfaces supporting VPLS, the Junos OS supports a subset of the IEEE 802.1Q standard for channelizing an Ethernet interface into multiple logical interfaces, allowing many hosts to be connected to the same Gigabit Ethernet switch, but preventing them from being in the same routing or bridging domain.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

vlan-tags

Syntax vlan-tags outer [*tpid*].*vlan-id* [inner [*tpid*].*vlan-id*];

Hierarchy Level [edit dynamic-profiles *profile-name* **interfaces** *interface-name* **unit** *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 9.5.
VLAN demux interface support introduced in Junos OS Release 10.2.

Description For Gigabit Ethernet IQ and IQE interfaces only, binds TPIDs and 802.1Q VLAN tag IDs to a logical interface. You must include the **stacked-vlan-tagging** statement at the **[edit interfaces *interface-name*]** hierarchy level.

NOTE: The inner-range *vid1–vid2* option is supported on MX Series routers with IQE PICs only.

Options

inner [*tpid*].*vlan-id*—A TPID (optional) and a valid VLAN identifier in the format *tpid*.*vlan-id*. When used in the **dynamic-profiles** hierarchy, specify the **$junos-vlan-id** predefined variable to dynamically obtain the VLAN ID.

Range: For VLAN ID, 1 through 4094. VLAN ID 0 is reserved for tagging the priority of frames.

outer [*tpid*].*vlan-id*—A TPID (optional) and a valid VLAN identifier in the format *tpid*.*vlan-id*. When used in the **dynamic-profiles** hierarchy, specify the **$junos-stacked-vlan-id** predefined variable.

Range: For VLAN ID, 1 through 511 for normal interfaces, and 512 through 4094 for VLAN CCC interfaces. VLAN ID 0 is reserved for tagging the priority of frames.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Dual VLAN Tags
- stacked-vlan-tagging

weighted-load-balancing (L2TP LAC)

Syntax weighted-load-balancing;

Hierarchy Level [edit services l2tp]

Release Information Statement introduced in Junos OS Release 10.4.

Description Specify that the router chooses among multiple tunnels that share the same preference level by considering the maximum sessions configured per tunnel. The tunnel configured with the highest maximum number of sessions in the preference level has the highest weight. This tunnel is selected until the maximum number of sessions for the tunnel is reached. Then the router selects the tunnel with the next higher weight to establish connections until that tunnel's maximum session limit is reached, 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 Weighted Load Balancing for LAC Tunnel Sessions on page 223
- Configuring the L2TP LAC Tunnel Selection Parameters on page 222

wimax

Syntax wimax;

Hierarchy Level [edit services **mobile-ip** access-type],
[edit logical-systems *logical-system-name* services **mobile-ip** access-type],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* services **mobile-ip** access-type],
[edit routing-instances *routing-instance-name* services **mobile-ip** access-type]

NOTE: Although this statement is available in the CLI for both default and nondefault router contexts, the commit operation is disallowed when you configure the statement in a nondefault router context.

Release Information Statement introduced in Junos OS Release 9.5.

Description Enable WiMAX features for Mobile IP home agent, including the ability to process, send, and receive WiMAX Vendor Specific Attributes (VSAs).

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation
- Configuring Mobile IP on page 315
- Configuring the Access Type for Mobile IP on page 322

wins-server

Syntax

```
wins-server {
  ipv4-address;
}
```

Hierarchy Level [edit access address-assignment pool *pool-name* family inet **dhcp-attributes**]

Release Information Statement introduced in Junos OS Release 9.0.

Description Specify one or more NetBIOS name servers (NBNS) that the client uses to resolve NetBIOS names. This is equivalent to DHCP option 44.

Options ***ipv4-address***—IP address of each NetBIOS name server; add them to the configuration in order of preference.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Address-Assignment Pools on page 56

PART 18

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