MobileNext Broadband Gateway

Network Architecture

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Table of Contents

List of Figures

Part 1 Overview

List of Tables

About the Documentation

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Supported Platforms

For the features described in this document, the following platforms are supported:

- MX240 Routers
- MX960 Routers
- MX480 Routers

Documentation Conventions

Table 1 on page x 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 x 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 OS 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; interface names; 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
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- Search technical bulletins for relevant hardware and software notifications: https://www.juniper.net/alerts/
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- 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/

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PART 1

Overview

CHAPTER 1

Network Architecture Overview

Overview of Mobile Networks

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

The major generations of mobile network architectures are:

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

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

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

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

Related Documentation

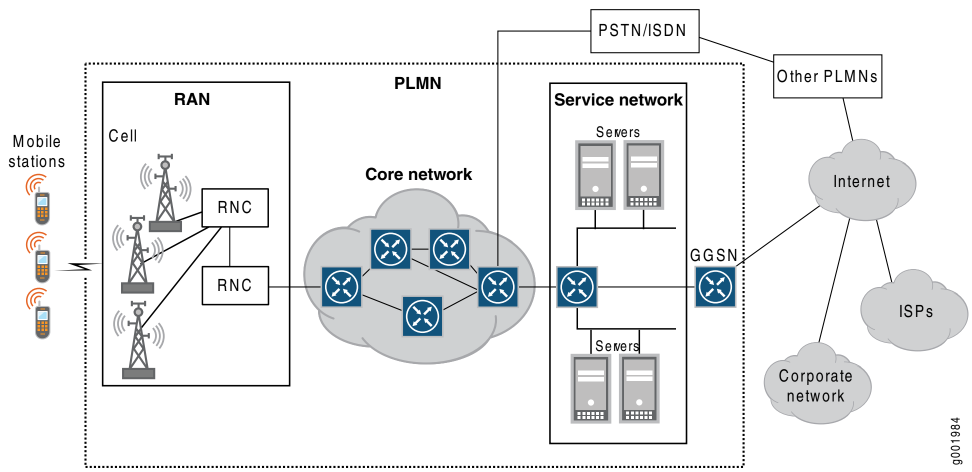
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 5
- Overview of GGSN and P-GW on page 6
- Overview of Packet Data Network Gateway Functions on page 12
- Overview of the Evolved Packet Core on page 14
- Overview of APNs on page 16
- Overview of PDP Contexts and Bearers on page 17
- Overview of GGSN and Broadband Gateway Deployment on page 19
- Overview of 4G/LTE and Broadband Gateway Deployment on page 20
- Overview of IPv6 and the Broadband Gateway on page 22
- Overview of IPv6 and the Broadband Gateway on page 22
- Serving Gateway and the S1 Interface Overview on page 8
- Serving Gateway and the S1 Interface Overview on page 8
- Service Areas and Tracking Areas Overview on page 9

Overview of 3G Mobile Networks and the MobileNext Broadband Gateway

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

Figure 1 on page 5 shows the overall architecture of a 3G network. The MobileNext Broadband Gateway is configured as the gateway GPRS support node (GGSN) in this architecture.

Figure 1: 3G Mobile Network Architecture



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

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

- A Radio Access Network (RAN). This is a hierarchical arrangement of cell towers and base stations. The base stations are called base transceiver stations (BTSs) or NobeBs in 3G. In some versions, there are also Radio Network Controllers (RNCs) that link to the BTSs to form a Radio Network Subsystem (RNS). A collection of RNSs using the Wideband CDMA (WCDMA) air interface option form the UMTS Terrestrial Radio Access Network (UTRAN). All of these are referred to as "network devices" in Figure 1 on page 5. The important point is that all handovers between cell towers are centrally controlled in the 3G network hierarchy.
- A core network (usually IP) tying the RAN to the 3G service network. The core network consists of all the switches, routers, and other network components required to transport mobile traffic.
- A service network reached through the core network. Some of the services reached (the servers in Figure 1 on page 5) are specific to the service provider, such as accounting information (current balance), short message service (SMS) texting, paging, and voice mail. Other services are reached through the GGSN (which is not properly

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

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

Related Documentation

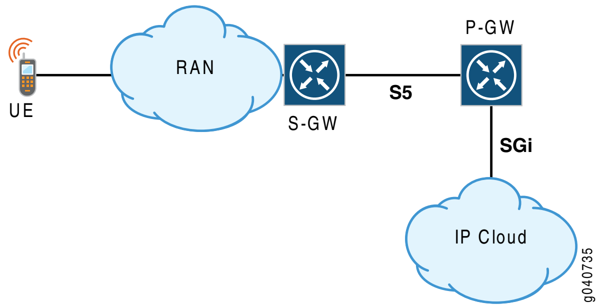
- Overview of Mobile Networks on page 3
- Overview of GGSN and P-GW on page 6
- Overview of Packet Data Network Gateway Functions on page 12
- Overview of the Evolved Packet Core on page 14
- Overview of APNs on page 16
- Overview of PDP Contexts and Bearers on page 17
- Overview of GGSN and Broadband Gateway Deployment on page 19
- Overview of 4G/LTE and Broadband Gateway Deployment on page 20
- Overview of IPv6 and the Broadband Gateway on page 22
- Overview of IPv6 and the Broadband Gateway on page 22
- Serving Gateway and the S1 Interface Overview on page 8
- Serving Gateway and the S1 Interface Overview on page 8
- Service Areas and Tracking Areas Overview on page 9

Overview of GGSN and P-GW

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

Figure 2 on page 7 shows the major components and interfaces of a mobile network based on 4G/LTE standards.

Figure 2: 4G/LTE Mobile Network Basic Components



The major components are:

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

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

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

Related Documentation

- Overview of Mobile Networks on page 3
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 5
- Overview of Packet Data Network Gateway Functions on page 12
- Overview of the Evolved Packet Core on page 14
- Overview of APNs on page 16
- Overview of PDP Contexts and Bearers on page 17
- Overview of GGSN and Broadband Gateway Deployment on page 19

- Overview of 4G/LTE and Broadband Gateway Deployment on page 20
- Overview of IPv6 and the Broadband Gateway on page 22
- Overview of IPv6 and the Broadband Gateway on page 22
- Serving Gateway and the S1 Interface Overview on page 8
- Serving Gateway and the S1 Interface Overview on page 8
- Service Areas and Tracking Areas Overview on page 9

Serving Gateway and the S1 Interface Overview

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

Figure 3: S1 Interface Is Many-to-Many

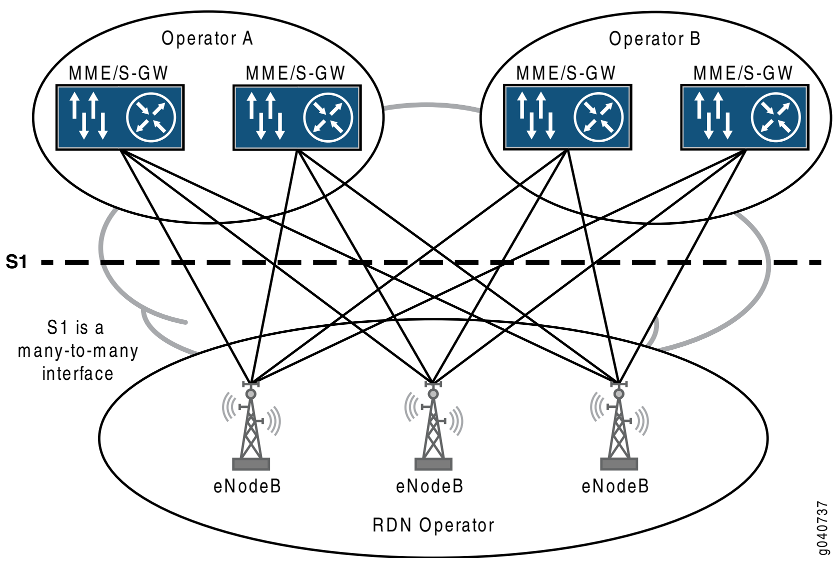


Figure 3 on page 8 shows that the S1 interface between eNodeBs and the MMEs and S-GWs is a many-to-many interface. The S1 interface supports redundancy and load sharing of these critical network nodes. Load sharing the MMEs allows the user equipment to operate in a given geographical area without changing the MME. S1 interface redundancy improves mobile network reliability. Finally, the many-to-many aspect of the S1 interface also allows the radio network to be shared by multiple operators.

Related Documentation

- Overview of Mobile Networks on page 3
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 5
- Overview of GGSN and P-GW on page 6
- Overview of Packet Data Network Gateway Functions on page 12

Service Areas and Tracking Areas Overview

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

Figure 4: Tracking Areas and the S1 Interface

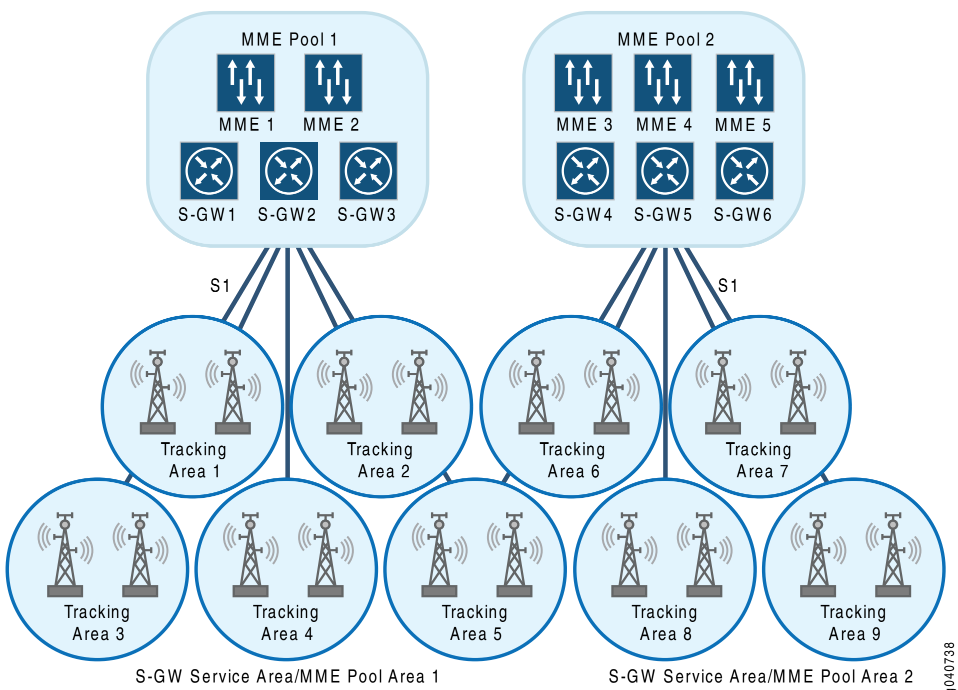


Figure 4 on page 9 shows the relationship between MME pools, S-GW serving areas (which coincide in this case), and enhanced Node B (eNodeB) tracking areas. A mobile user can move around inside the areas of this example network without changing either

S-GW or MME. However, if the mobile user moves between the two tracking areas shown in the figure, both an MME hand-over and an S-GW hand-over will occur. Note the role of the S1 interface.

Related Documentation

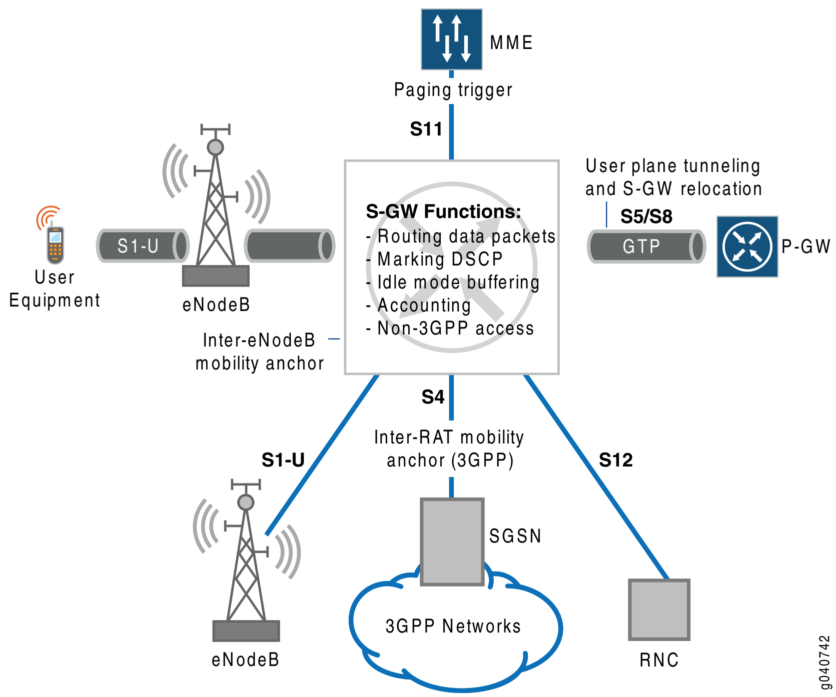
- Overview of Mobile Networks on page 3
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 5
- Overview of GGSN and P-GW on page 6
- Overview of Packet Data Network Gateway Functions on page 12
- Overview of the Evolved Packet Core on page 14
- Overview of APNs on page 16
- Overview of PDP Contexts and Bearers on page 17
- Overview of GGSN and Broadband Gateway Deployment on page 19
- Overview of 4G/LTE and Broadband Gateway Deployment on page 20
- Overview of IPv6 and the Broadband Gateway on page 22
- Serving Gateway and the S1 Interface Overview on page 8
- Serving Gateway Functions Overview on page 10

Serving Gateway Functions Overview

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

Figure 5 on page 11 shows the broadband gateway configured as a standalone S-GW in a 4G mobile network. A mobile device only has one S-GW at any point in time.

Figure 5: S-GW Functions



The functions of the S-GW include:

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

Related Documentation

- Overview of Mobile Networks on page 3
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 5
- Overview of GGSN and P-GW on page 6
- Overview of Packet Data Network Gateway Functions on page 12
- Overview of the Evolved Packet Core on page 14
- Overview of APNs on page 16

- Overview of PDP Contexts and Bearers on page 17
- Overview of GGSN and Broadband Gateway Deployment on page 19
- Overview of 4G/LTE and Broadband Gateway Deployment on page 20
- Overview of IPv6 and the Broadband Gateway on page 22
- Serving Gateway and the S1 Interface Overview on page 8
- Service Areas and Tracking Areas Overview on page 9

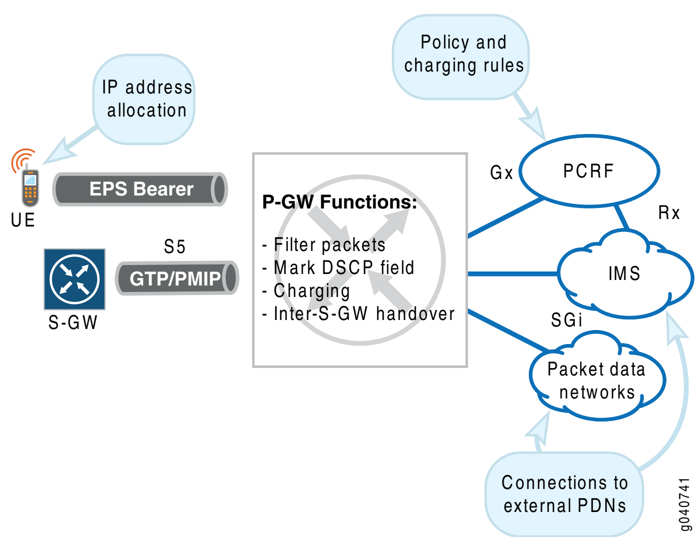
Overview of Packet Data Network Gateway Functions

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

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

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

Figure 6: Packet Data Network Gateway Functions



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

The important interfaces on the P-GW shown in Figure 6 on page 12 are:

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

Related Documentation

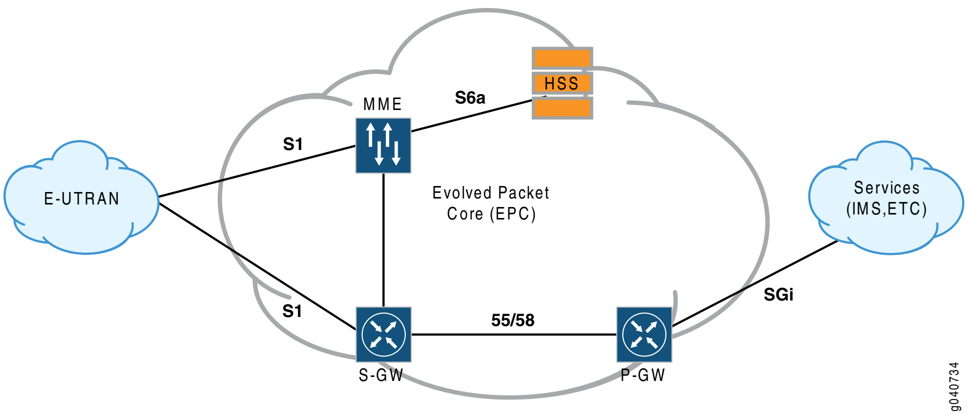
- Overview of Mobile Networks on page 3
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 5
- Overview of GGSN and P-GW on page 6
- Overview of the Evolved Packet Core on page 14
- Overview of APNs on page 16
- Overview of PDP Contexts and Bearers on page 17
- Overview of GGSN and Broadband Gateway Deployment on page 19
- Overview of 4G/LTE and Broadband Gateway Deployment on page 20
- Overview of IPv6 and the Broadband Gateway on page 22
- Overview of IPv6 and the Broadband Gateway on page 22
- Serving Gateway and the S1 Interface Overview on page 8
- Serving Gateway and the S1 Interface Overview on page 8
- Service Areas and Tracking Areas Overview on page 9

Overview of the Evolved Packet Core

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

Figure 7 on page 14 shows the major components and interfaces of the EPC of a mobile network based on LTE standards. The user equipment can attach to only one Mobility Management Entity (MME) and S-GW at a time, but the user equipment can have connectivity to multiple P-GWs.

Figure 7: Major Components of the Evolved Packet Core



The major components in the figure are:

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

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

The major interfaces in the figure are:

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

Related Documentation

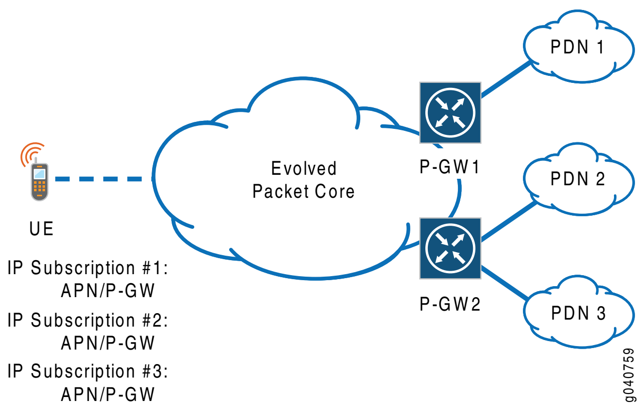
- Overview of Mobile Networks on page 3
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 5
- Overview of GGSN and P-GW on page 6
- Overview of Packet Data Network Gateway Functions on page 12
- Overview of APNs on page 16
- Overview of PDP Contexts and Bearers on page 17
- Overview of GGSN and Broadband Gateway Deployment on page 19
- Overview of 4G/LTE and Broadband Gateway Deployment on page 20
- Overview of IPv6 and the Broadband Gateway on page 22
- Overview of IPv6 and the Broadband Gateway on page 22
- Serving Gateway and the S1 Interface Overview on page 8
- Serving Gateway and the S1 Interface Overview on page 8
- Service Areas and Tracking Areas Overview on page 9

Overview of APNs

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

In the Long Term Evolution (LTE) architecture for the Evolved Packet Core (EPC), the APN determines the P-GW the user equipment should use. The APN also defines the tunnel connecting the user equipment to a PDN such as the Internet. Each PDN that the user subscribes to has an APN and an associated P-GW, often called a “PDN subscription context.” One context is the default APN, connecting to a PDN such as the Internet unless the user activates another APN. Figure 8 on page 16 shows the relationship among APNs, P-GWs, and packet networks.

Figure 8: APNs and the P-GW



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

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

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

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

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

Related Documentation

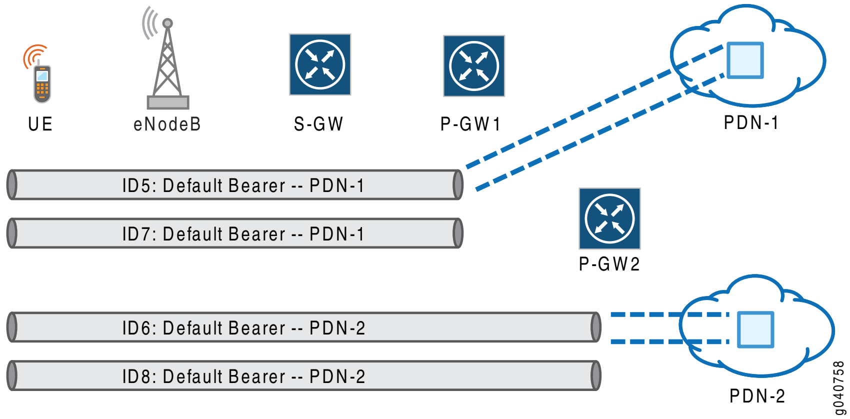
- Overview of Mobile Networks on page 3
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 5
- Overview of GGSN and P-GW on page 6
- Overview of Packet Data Network Gateway Functions on page 12
- Overview of the Evolved Packet Core on page 14
- Overview of PDP Contexts and Bearers on page 17
- Overview of GGSN and Broadband Gateway Deployment on page 19
- Overview of 4G/LTE and Broadband Gateway Deployment on page 20
- Overview of IPv6 and the Broadband Gateway on page 22
- Overview of IPv6 and the Broadband Gateway on page 22
- Serving Gateway and the S1 Interface Overview on page 8
- Serving Gateway and the S1 Interface Overview on page 8
- Service Areas and Tracking Areas Overview on page 9

Overview of PDP Contexts and Bearers

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

In older architectures, bearers were known as packet data protocol (PDP) contexts. One PDP context connects to one PDN location by default (this was the default PDP context). Other PDP contexts (up to 11) could be established to or from the same user device. The maximum of 11 still holds in 4G/LTE networks. Figure 9 on page 18 shows the relationship between bearers and P-GWs.

Figure 9: Bearers, Gateways, and Packet Networks



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

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

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

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

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

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

Related Documentation

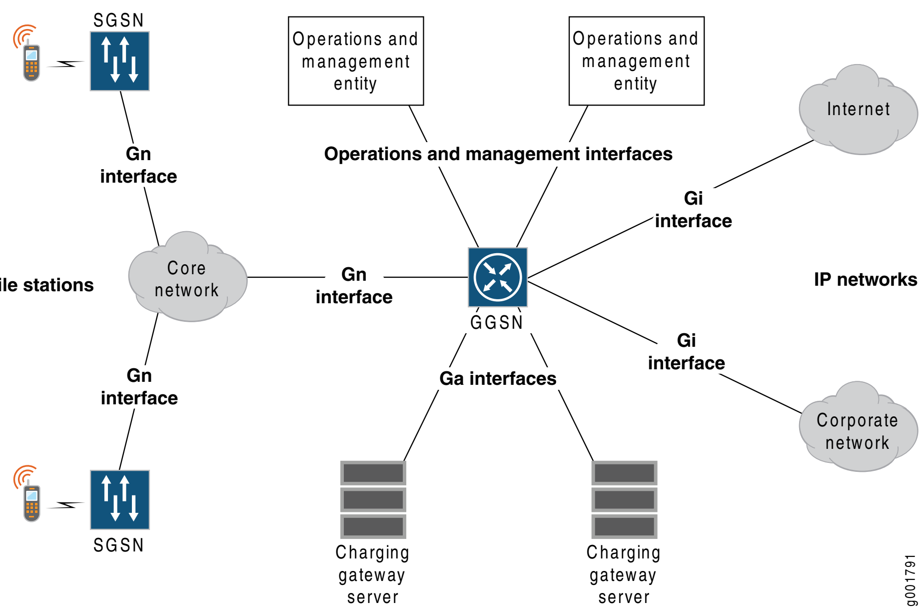
- Overview of Mobile Networks on page 3
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 5
- Overview of GGSN and P-GW on page 6
- Overview of Packet Data Network Gateway Functions on page 12
- Overview of the Evolved Packet Core on page 14
- Overview of APNs on page 16
- Overview of GGSN and Broadband Gateway Deployment on page 19
- Overview of 4G/LTE and Broadband Gateway Deployment on page 20
- Overview of IPv6 and the Broadband Gateway on page 22
- Overview of IPv6 and the Broadband Gateway on page 22
- Serving Gateway and the S1 Interface Overview on page 8
- Serving Gateway and the S1 Interface Overview on page 8
- Service Areas and Tracking Areas Overview on page 9

Overview of GGSN and Broadband Gateway Deployment

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

Figure 10 on page 19 shows how a GGSN (the broadband gateway) is deployed in a 3G network. The devices that the GGSN connects to are shown as well.

Figure 10: The GGSN in a 3G Network



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

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

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

Related Documentation

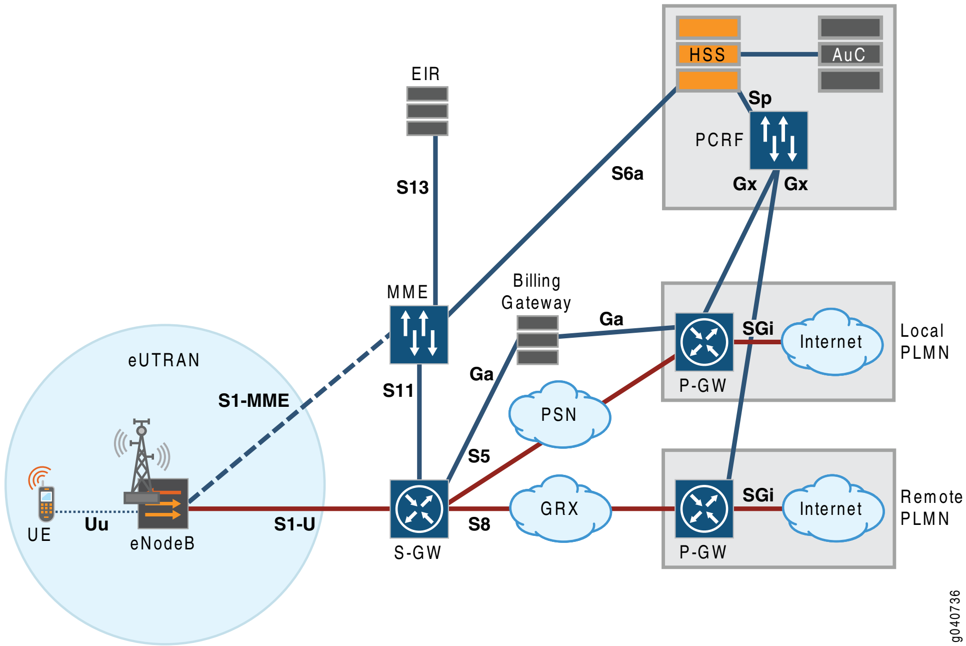
- Overview of Mobile Networks on page 3
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 5
- Overview of GGSN and P-GW on page 6
- Overview of Packet Data Network Gateway Functions on page 12
- Overview of the Evolved Packet Core on page 14
- Overview of APNs on page 16
- Overview of PDP Contexts and Bearers on page 17
- Overview of 4G/LTE and Broadband Gateway Deployment on page 20
- Overview of IPv6 and the Broadband Gateway on page 22
- Overview of IPv6 and the Broadband Gateway on page 22
- Serving Gateway and the S1 Interface Overview on page 8
- Serving Gateway and the S1 Interface Overview on page 8
- Service Areas and Tracking Areas Overview on page 9

Overview of 4G/LTE and Broadband Gateway Deployment

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

Figure 11 on page 21 shows the major components and interfaces of a Long Term Evolution (LTE) mobile network from user equipment to network. Some of the major interfaces and components are labeled, but the emphasis here is on how these pieces are organized into a mobile network.

Figure 11: LTE Network Deployment Scenario



The major parts of the figure are:

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

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

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

Related Documentation

- Overview of Mobile Networks on page 3
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 5
- Overview of GGSN and P-GW on page 6
- Overview of Packet Data Network Gateway Functions on page 12
- Overview of the Evolved Packet Core on page 14
- Overview of APNs on page 16
- Overview of PDP Contexts and Bearers on page 17
- Overview of GGSN and Broadband Gateway Deployment on page 19
- Overview of IPv6 and the Broadband Gateway on page 22
- Serving Gateway and the S1 Interface Overview on page 8
- Serving Gateway and the S1 Interface Overview on page 8
- Service Areas and Tracking Areas Overview on page 9

Overview of IPv6 and the Broadband Gateway

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

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

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

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

Related Documentation

- Overview of Mobile Networks on page 3
- Overview of 3G Mobile Networks and the MobileNext Broadband Gateway on page 5
- Overview of GGSN and P-GW on page 6
- Overview of Packet Data Network Gateway Functions on page 12
- Overview of the Evolved Packet Core on page 14

- Overview of APNs on page 16
- Overview of PDP Contexts and Bearers on page 17
- Overview of GGSN and Broadband Gateway Deployment on page 19
- Overview of 4G/LTE and Broadband Gateway Deployment on page 20
- Serving Gateway and the S1 Interface Overview on page 8

- Serving Gateway and the S1 Interface Overview on page 8

- Service Areas and Tracking Areas Overview on page 9

PART 2

Index

Index

Symbols

A

B

C

D

E

F

G

H

I

M