



Cisco IOS Mobile Wireless Command Reference

GGSN Release 4.0

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Cisco IOS Mobile Wireless Command Reference

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About Cisco IOS Software Documentation

This chapter discusses the objectives, audience, organization, and conventions of Cisco IOS software documentation. It also provides sources for obtaining documentation from Cisco Systems.

Documentation Objectives

Cisco IOS software documentation describes the tasks and commands necessary to configure and maintain Cisco networking devices.

Audience

The Cisco IOS software documentation set is intended primarily for users who configure and maintain Cisco networking devices (such as routers and switches) but who may not be familiar with the tasks, the relationship between tasks, or the Cisco IOS software commands necessary to perform particular tasks. The Cisco IOS software documentation set is also intended for those users experienced with Cisco IOS software who need to know about new features, new configuration options, and new software characteristics in the current Cisco IOS software release.

Documentation Organization

The Cisco IOS software documentation set consists of documentation modules and master indexes. In addition to the main documentation set, there are supporting documents and resources.

Documentation Modules

The Cisco IOS documentation modules consist of configuration guides and corresponding command reference publications. Chapters in a configuration guide describe protocols, configuration tasks, and Cisco IOS software functionality and contain comprehensive configuration examples. Chapters in a command reference publication provide complete Cisco IOS command syntax information. Use each configuration guide in conjunction with its corresponding command reference publication.

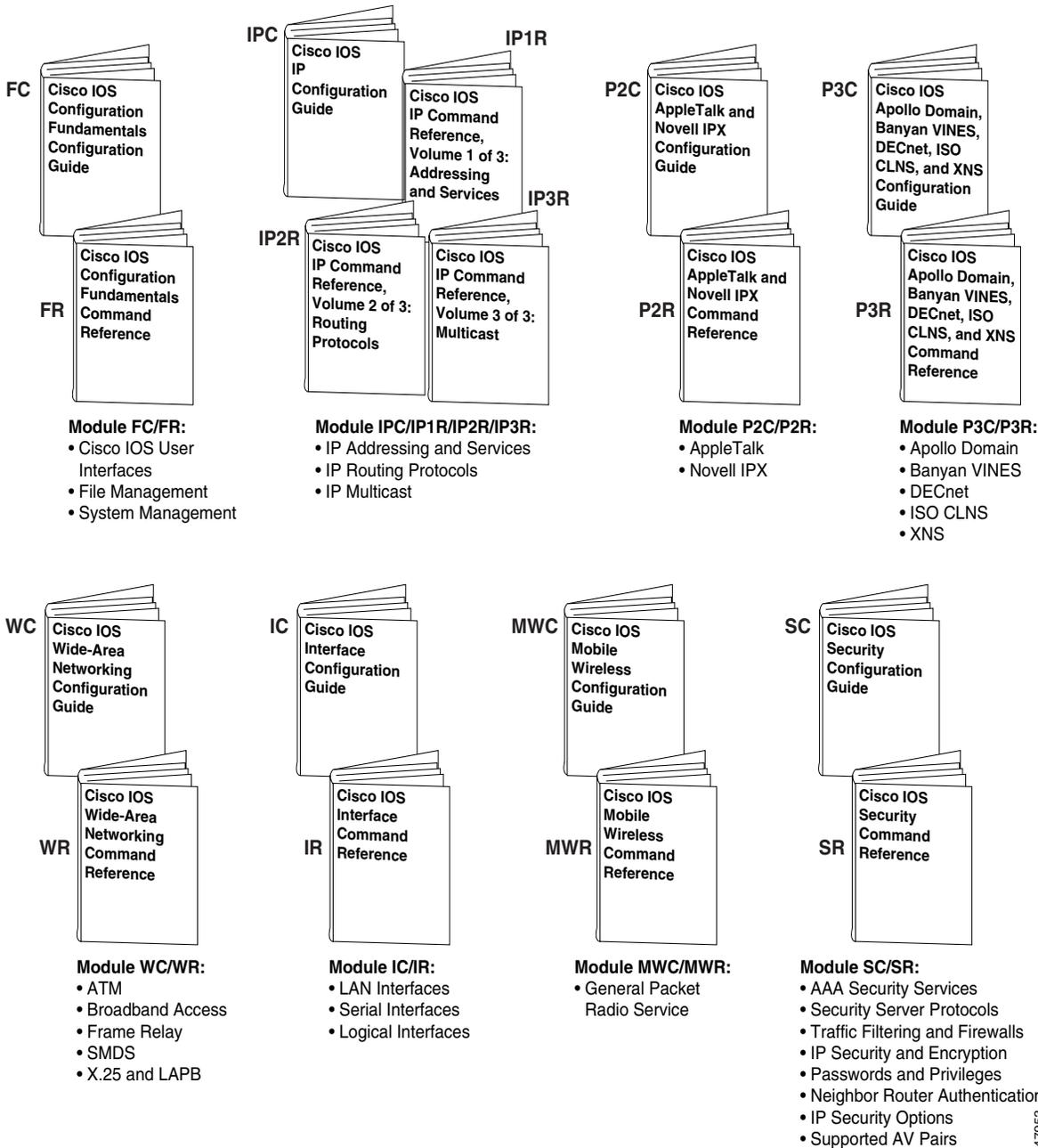
Figure 1 shows the Cisco IOS software documentation modules.



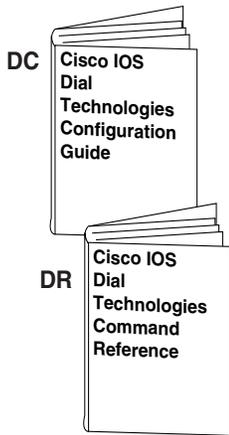
Note

The abbreviations (for example, FC and FR) next to the book icons are page designators, which are defined in a key in the index of each document to help you with navigation. The bullets under each module list the major technology areas discussed in the corresponding books.

Figure 1 Cisco IOS Software Documentation Modules

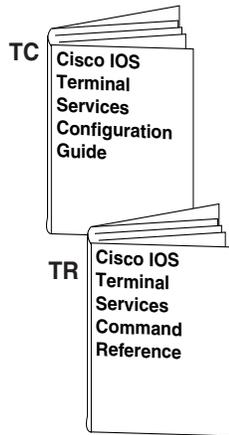


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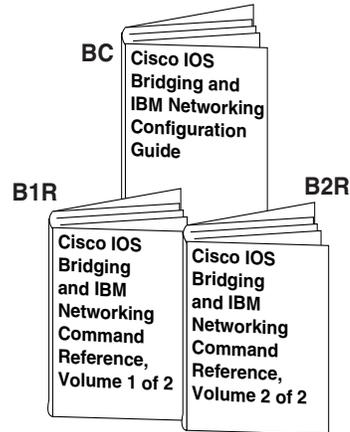
Module DC/DR:

- Preparing for Dial Access
- Modem and Dial Shelf Configuration and Management
- ISDN Configuration
- Signalling Configuration
- Dial-on-Demand Routing Configuration
- Dial-Backup Configuration
- Dial-Related Addressing Services
- Virtual Templates, Profiles, and Networks
- PPP Configuration
- Callback and Bandwidth Allocation Configuration
- Dial Access Specialized Features
- Dial Access Scenarios



Module TC/TR:

- ARA
- LAT
- NASI
- Telnet
- TN3270
- XRemote
- X.28 PAD
- Protocol Translation

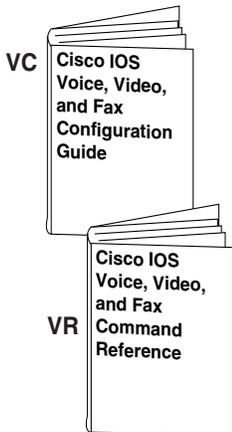


Module BC/B1R:

- Transparent Bridging
- SRB
- Token Ring Inter-Switch Link
- Token Ring Route Switch Module
- RSRB
- DLSw+
- Serial Tunnel and Block Serial Tunnel
- LLC2 and SDLC
- IBM Network Media Translation
- SNA Frame Relay Access
- NCIA Client/Server
- Airline Product Set

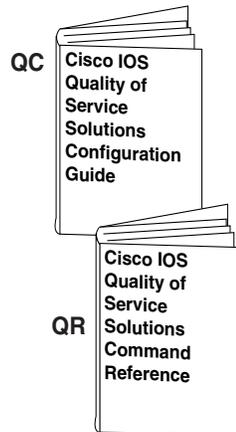
Module BC/B2R:

- DSPU and SNA Service Point
- SNA Switching Services
- Cisco Transaction Connection
- Cisco Mainframe Channel Connection
- CLAW and TCP/IP Offload
- CSNA, CMPC, and CMPC+
- TN3270 Server



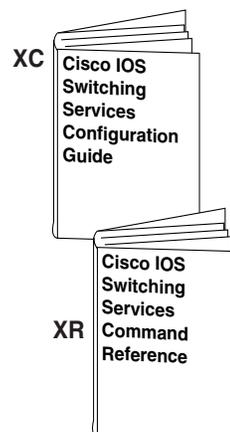
Module VC/VR:

- Voice over IP
- Call Control Signalling
- Voice over Frame Relay
- Voice over ATM
- Telephony Applications
- Trunk Management
- Fax, Video, and Modem Support



Module QC/QR:

- Packet Classification
- Congestion Management
- Congestion Avoidance
- Policing and Shaping
- Signalling
- Link Efficiency Mechanisms



Module XC/XR:

- Cisco IOS Switching Paths
- NetFlow Switching
- Multiprotocol Label Switching
- Multilayer Switching
- Multicast Distributed Switching
- Virtual LANs
- LAN Emulation

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Master Indexes

Two master indexes provide indexing information for the Cisco IOS software documentation set: an index for the configuration guides and an index for the command references. Individual books also contain a book-specific index.

The master indexes provide a quick way for you to find a command when you know the command name but not which module contains the command. When you use the online master indexes, you can click the page number for an index entry and go to that page in the online document.

Supporting Documents and Resources

The following documents and resources support the Cisco IOS software documentation set:

- *Cisco IOS Command Summary* (two volumes)—This publication explains the function and syntax of the Cisco IOS software commands. For more information about defaults and usage guidelines, refer to the Cisco IOS command reference publications.
- *Cisco IOS System Error Messages*—This publication lists and describes Cisco IOS system error messages. Not all system error messages indicate problems with your system. Some are purely informational, and others may help diagnose problems with communications lines, internal hardware, or the system software.
- *Cisco IOS Debug Command Reference*—This publication contains an alphabetical listing of the **debug** commands and their descriptions. Documentation for each command includes a brief description of its use, command syntax, usage guidelines, and sample output.
- *Dictionary of Internetworking Terms and Acronyms*—This Cisco publication compiles and defines the terms and acronyms used in the internetworking industry.
- New feature documentation—The Cisco IOS software documentation set documents the mainline release of Cisco IOS software (for example, Cisco IOS Release 12.2). New software features are introduced in early deployment releases (for example, the Cisco IOS “T” release train for 12.2, 12.2(x)T). Documentation for these new features can be found in standalone documents called “feature modules.” Feature module documentation describes new Cisco IOS software and hardware networking functionality and is available on Cisco.com and the Documentation CD-ROM.
- Release notes—This documentation describes system requirements, provides information about new and changed features, and includes other useful information about specific software releases. See the section “Using Software Release Notes” in the chapter “Using Cisco IOS Software” for more information.
- Caveats documentation—This documentation provides information about Cisco IOS software defects in specific software releases.
- RFCs—RFCs are standards documents maintained by the Internet Engineering Task Force (IETF). Cisco IOS software documentation references supported RFCs when applicable. The full text of referenced RFCs may be obtained on the World Wide Web at <http://www.rfc-editor.org/>.
- MIBs—MIBs are used for network monitoring. For lists of supported MIBs by platform and release, and to download MIB files, see the Cisco MIB website on Cisco.com at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

Document Conventions

Within Cisco IOS software documentation, the term *router* is generally used to refer to a variety of Cisco products (for example, routers, access servers, and switches). Routers, access servers, and other networking devices that support Cisco IOS software are shown interchangeably within examples. These products are used only for illustrative purposes; that is, an example that shows one product does not necessarily indicate that other products are not supported.

The Cisco IOS documentation set uses the following conventions:

Convention	Description
^ or Ctrl	The ^ and Ctrl symbols represent the Control key. For example, the key combination ^D or Ctrl-D means hold down the Control key while you press the D key. Keys are indicated in capital letters but are not case sensitive.
<i>string</i>	A string is a nonquoted set of characters shown in italics. For example, when setting an SNMP community string to public, do not use quotation marks around the string or the string will include the quotation marks.

Command syntax descriptions use the following conventions:

Convention	Description
boldface	Boldface text indicates commands and keywords that you enter literally as shown.
<i>italics</i>	Italic text indicates arguments for which you supply values.
[x]	Square brackets enclose an optional element (keyword or argument).
	A vertical line indicates a choice within an optional or required set of keywords or arguments.
[x y]	Square brackets enclosing keywords or arguments separated by a vertical line indicate an optional choice.
{x y}	Braces enclosing keywords or arguments separated by a vertical line indicate a required choice.

Nested sets of square brackets or braces indicate optional or required choices within optional or required elements. For example:

Convention	Description
[x {y z}]	Braces and a vertical line within square brackets indicate a required choice within an optional element.

Examples use the following conventions:

Convention	Description
screen	Examples of information displayed on the screen are set in Courier font.
boldface screen	Examples of text that you must enter are set in Courier bold font.
< >	Angle brackets enclose text that is not printed to the screen, such as passwords.

Convention	Description
!	An exclamation point at the beginning of a line indicates a comment line. (Exclamation points are also displayed by the Cisco IOS software for certain processes.)
[]	Square brackets enclose default responses to system prompts.

The following conventions are used to attract the attention of the reader:

**Caution**

Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

**Note**

Means *reader take note*. Notes contain helpful suggestions or references to materials not contained in this manual.

**Timesaver**

Means the *described action saves time*. You can save time by performing the action described in the paragraph.

Obtaining Documentation

These sections explain how to obtain documentation from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at this URL:

<http://www.cisco.com>

Translated documentation is available at this URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package, which is shipped with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual subscription.

Ordering Documentation

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Networking Products MarketPlace:

http://www.cisco.com/cgi-bin/order/order_root.pl

- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:

<http://www.cisco.com/go/subscription>

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, U.S.A.) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

Documentation Feedback

You can submit comments electronically on Cisco.com. In the Cisco Documentation home page, click the **Fax** or **Email** option in the “Leave Feedback” section at the bottom of the page.

You can e-mail your comments to bug-doc@cisco.com.

You can submit your comments by mail by using the response card behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Document Resource Connection
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

Cisco provides Cisco.com as a starting point for all technical assistance. Customers and partners can obtain online documentation, troubleshooting tips, and sample configurations from online tools by using the Cisco Technical Assistance Center (TAC) Web Site. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC Web Site.

Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com is a highly integrated Internet application and a powerful, easy-to-use tool that provides a broad range of features and services to help you with these tasks:

- Streamline business processes and improve productivity
- Resolve technical issues with online support
- Download and test software packages
- Order Cisco learning materials and merchandise
- Register for online skill assessment, training, and certification programs

If you want to obtain customized information and service, you can self-register on Cisco.com. To access Cisco.com, go to this URL:

<http://www.cisco.com>

Technical Assistance Center

The Cisco Technical Assistance Center (TAC) is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two levels of support are available: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Cisco TAC inquiries are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

The Cisco TAC resource that you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

Cisco TAC Web Site

You can use the Cisco TAC Web Site to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to this URL:

<http://www.cisco.com/tac>

All customers, partners, and resellers who have a valid Cisco service contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to this URL to register:

<http://www.cisco.com/register/>

If you are a Cisco.com registered user, and you cannot resolve your technical issues by using the Cisco TAC Web Site, you can open a case online by using the TAC Case Open tool at this URL:

<http://www.cisco.com/tac/caseopen>

If you have Internet access, we recommend that you open P3 and P4 cases through the Cisco TAC Web Site.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses priority level 1 or priority level 2 issues. These classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer automatically opens a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to this URL:

<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled: for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). When you call the center, please have available your service agreement number and your product serial number.



Using Cisco IOS Software

This chapter provides helpful tips for understanding and configuring Cisco IOS software using the command-line interface (CLI). It contains the following sections:

- Understanding Command Modes
- Getting Help
- Using the no and default Forms of Commands
- Saving Configuration Changes
- Filtering Output from the show and more Commands
- Identifying Supported Platforms

For an overview of Cisco IOS software configuration, refer to the *Cisco IOS Configuration Fundamentals Configuration Guide*.

For information on the conventions used in the Cisco IOS software documentation set, see the chapter “About Cisco IOS Software Documentation” located at the beginning of this book.

Understanding Command Modes

You use the CLI to access Cisco IOS software. Because the CLI is divided into many different modes, the commands available to you at any given time depend on the mode you are currently in. Entering a question mark (?) at the CLI prompt allows you to obtain a list of commands available for each command mode.

When you log in to the CLI, you are in user EXEC mode. User EXEC mode contains only a limited subset of commands. To have access to all commands, you must enter privileged EXEC mode, normally by using a password. From privileged EXEC mode you can issue any EXEC command—user or privileged mode—or you can enter global configuration mode. Most EXEC commands are one-time commands. For example, **show** commands show important status information, and **clear** commands clear counters or interfaces. The EXEC commands are not saved when the software reboots.

Configuration modes allow you to make changes to the running configuration. If you later save the running configuration to the startup configuration, these changed commands are stored when the software is rebooted. To enter specific configuration modes, you must start at global configuration mode. From global configuration mode, you can enter interface configuration mode and a variety of other modes, such as protocol-specific modes.

ROM monitor mode is a separate mode used when the Cisco IOS software cannot load properly. If a valid software image is not found when the software boots or if the configuration file is corrupted at startup, the software might enter ROM monitor mode.

Table 1 describes how to access and exit various common command modes of the Cisco IOS software. It also shows examples of the prompts displayed for each mode.

Table 1 Accessing and Exiting Command Modes

Command Mode	Access Method	Prompt	Exit Method
User EXEC	Log in.	Router>	Use the logout command.
Privileged EXEC	From user EXEC mode, use the enable EXEC command.	Router#	To return to user EXEC mode, use the disable command.
Global configuration	From privileged EXEC mode, use the configure terminal privileged EXEC command.	Router(config)#	To return to privileged EXEC mode from global configuration mode, use the exit or end command, or press Ctrl-Z .
Interface configuration	From global configuration mode, specify an interface using an interface command.	Router(config-if)#	To return to global configuration mode, use the exit command. To return to privileged EXEC mode, use the end command, or press Ctrl-Z .
ROM monitor	From privileged EXEC mode, use the reload EXEC command. Press the Break key during the first 60 seconds while the system is booting.	>	To exit ROM monitor mode, use the continue command.

For more information on command modes, refer to the “Using the Command-Line Interface” chapter in the *Cisco IOS Configuration Fundamentals Configuration Guide*.

Getting Help

Entering a question mark (?) at the CLI prompt displays a list of commands available for each command mode. You can also get a list of keywords and arguments associated with any command by using the context-sensitive help feature.

To get help specific to a command mode, a command, a keyword, or an argument, use one of the following commands:

Command	Purpose
help	Provides a brief description of the help system in any command mode.
<i>abbreviated-command-entry?</i>	Provides a list of commands that begin with a particular character string. (No space between command and question mark.)
<i>abbreviated-command-entry<Tab></i>	Completes a partial command name.
?	Lists all commands available for a particular command mode.
<i>command ?</i>	Lists the keywords or arguments that you must enter next on the command line. (Space between command and question mark.)

Example: How to Find Command Options

This section provides an example of how to display syntax for a command. The syntax can consist of optional or required keywords and arguments. To display keywords and arguments for a command, enter a question mark (?) at the configuration prompt or after entering part of a command followed by a space. The Cisco IOS software displays a list and brief description of available keywords and arguments. For example, if you were in global configuration mode and wanted to see all the keywords or arguments for the **arap** command, you would type **arap ?**.

The <cr> symbol in command help output stands for “carriage return.” On older keyboards, the carriage return key is the Return key. On most modern keyboards, the carriage return key is the Enter key. The <cr> symbol at the end of command help output indicates that you have the option to press **Enter** to complete the command and that the arguments and keywords in the list preceding the <cr> symbol are optional. The <cr> symbol by itself indicates that no more arguments or keywords are available and that you must press **Enter** to complete the command.

Table 2 shows examples of how you can use the question mark (?) to assist you in entering commands. The table steps you through configuring an IP address on a serial interface on a Cisco 7206 router that is running Cisco IOS Release 12.0(3).

Table 2 How to Find Command Options

Command	Comment
<pre>Router> enable Password: <password> Router#</pre>	<p>Enter the enable command and password to access privileged EXEC commands. You are in privileged EXEC mode when the prompt changes to Router#.</p>
<pre>Router# configure terminal Enter configuration commands, one per line. End with CNTL/Z. Router(config)#</pre>	<p>Enter the configure terminal privileged EXEC command to enter global configuration mode. You are in global configuration mode when the prompt changes to Router(config)#.</p>
<pre>Router(config)# interface serial ? <0-6> Serial interface number Router(config)# interface serial 4 ? / Router(config)# interface serial 4/ ? <0-3> Serial interface number Router(config)# interface serial 4/0 Router(config-if)#</pre>	<p>Enter interface configuration mode by specifying the serial interface that you want to configure using the interface serial global configuration command.</p> <p>Enter ? to display what you must enter next on the command line. In this example, you must enter the serial interface slot number and port number, separated by a forward slash.</p> <p>You are in interface configuration mode when the prompt changes to Router(config-if)#.</p>

Table 2 How to Find Command Options (continued)

Command	Comment
<pre>Router(config-if)# ? Interface configuration commands: . . . ip Interface Internet Protocol config commands keepalive Enable keepalive lan-name LAN Name command llc2 LLC2 Interface Subcommands load-interval Specify interval for load calculation for an interface locaddr-priority Assign a priority group logging Configure logging for interface loopback Configure internal loopback on an interface mac-address Manually set interface MAC address mls mls router sub/interface commands mpoa MPOA interface configuration commands mtu Set the interface Maximum Transmission Unit (MTU) netbios Use a defined NETBIOS access list or enable name-caching no Negate a command or set its defaults nrzi-encoding Enable use of NRZI encoding ntp Configure NTP . . . Router(config-if)#</pre>	<p>Enter ? to display a list of all the interface configuration commands available for the serial interface. This example shows only some of the available interface configuration commands.</p>
<pre>Router(config-if)# ip ? Interface IP configuration subcommands: access-group Specify access control for packets accounting Enable IP accounting on this interface address Set the IP address of an interface authentication authentication subcommands bandwidth-percent Set EIGRP bandwidth limit broadcast-address Set the broadcast address of an interface cgmp Enable/disable CGMP directed-broadcast Enable forwarding of directed broadcasts dvmrp DVMRP interface commands hello-interval Configures IP-EIGRP hello interval helper-address Specify a destination address for UDP broadcasts hold-time Configures IP-EIGRP hold time . . . Router(config-if)# ip</pre>	<p>Enter the command that you want to configure for the interface. This example uses the ip command.</p> <p>Enter ? to display what you must enter next on the command line. This example shows only some of the available interface IP configuration commands.</p>

Table 2 How to Find Command Options (continued)

Command	Comment
<pre>Router(config-if)# ip address ? A.B.C.D IP address negotiated IP Address negotiated over PPP Router(config-if)# ip address</pre>	<p>Enter the command that you want to configure for the interface. This example uses the ip address command.</p> <p>Enter ? to display what you must enter next on the command line. In this example, you must enter an IP address or the negotiated keyword.</p> <p>A carriage return (<cr>) is not displayed; therefore, you must enter additional keywords or arguments to complete the command.</p>
<pre>Router(config-if)# ip address 172.16.0.1 ? A.B.C.D IP subnet mask Router(config-if)# ip address 172.16.0.1</pre>	<p>Enter the keyword or argument you want to use. This example uses the 172.16.0.1 IP address.</p> <p>Enter ? to display what you must enter next on the command line. In this example, you must enter an IP subnet mask.</p> <p>A <cr> is not displayed; therefore, you must enter additional keywords or arguments to complete the command.</p>
<pre>Router(config-if)# ip address 172.16.0.1 255.255.255.0 ? secondary Make this IP address a secondary address <cr> Router(config-if)# ip address 172.16.0.1 255.255.255.0</pre>	<p>Enter the IP subnet mask. This example uses the 255.255.255.0 IP subnet mask.</p> <p>Enter ? to display what you must enter next on the command line. In this example, you can enter the secondary keyword, or you can press Enter.</p> <p>A <cr> is displayed; you can press Enter to complete the command, or you can enter another keyword.</p>
<pre>Router(config-if)# ip address 172.16.0.1 255.255.255.0 Router(config-if)#</pre>	<p>In this example, Enter is pressed to complete the command.</p>

Using the no and default Forms of Commands

Almost every configuration command has a **no** form. In general, use the **no** form to disable a function. Use the command without the **no** keyword to reenable a disabled function or to enable a function that is disabled by default. For example, IP routing is enabled by default. To disable IP routing, use the **no ip routing** command; to reenable IP routing, use the **ip routing** command. The Cisco IOS software command reference publications provide the complete syntax for the configuration commands and describe what the **no** form of a command does.

Configuration commands also can have a **default** form, which returns the command settings to the default values. Most commands are disabled by default, so in such cases using the **default** form has the same result as using the **no** form of the command. However, some commands are enabled by default and

have variables set to certain default values. In these cases, the **default** form of the command enables the command and sets the variables to their default values. The Cisco IOS software command reference publications describe the effect of the **default** form of a command if the command functions differently than the **no** form.

Saving Configuration Changes

Use the **copy system:running-config nvram:startup-config** command to save your configuration changes to the startup configuration so that the changes will not be lost if the software reloads or a power outage occurs. For example:

```
Router# copy system:running-config nvram:startup-config
Building configuration...
```

It might take a minute or two to save the configuration. After the configuration has been saved, the following output appears:

```
[OK]
Router#
```

On most platforms, this task saves the configuration to NVRAM. On the Class A Flash file system platforms, this task saves the configuration to the location specified by the CONFIG_FILE environment variable. The CONFIG_FILE variable defaults to NVRAM.

Filtering Output from the show and more Commands

In Cisco IOS Release 12.0(1)T and later releases, you can search and filter the output of **show** and **more** commands. This functionality is useful if you need to sort through large amounts of output or if you want to exclude output that you need not see.

To use this functionality, enter a **show** or **more** command followed by the “pipe” character (|); one of the keywords **begin**, **include**, or **exclude**; and a regular expression on which you want to search or filter (the expression is case-sensitive):

```
command | {begin | include | exclude} regular-expression
```

The output matches certain lines of information in the configuration file. The following example illustrates how to use output modifiers with the **show interface** command when you want the output to include only lines in which the expression “protocol” appears:

```
Router# show interface | include protocol

FastEthernet0/0 is up, line protocol is up
Serial4/0 is up, line protocol is up
Serial4/1 is up, line protocol is up
Serial4/2 is administratively down, line protocol is down
Serial4/3 is administratively down, line protocol is down
```

For more information on the search and filter functionality, refer to the “Using the Command-Line Interface” chapter in the *Cisco IOS Configuration Fundamentals Configuration Guide*.

Identifying Supported Platforms

Cisco IOS software is packaged in feature sets consisting of software images that support specific platforms. The feature sets available for a specific platform depend on which Cisco IOS software images are included in a release. To identify the set of software images available in a specific release or to find out if a feature is available in a given Cisco IOS software image, see the following sections:

- Using Feature Navigator
- Using Software Release Notes

Using Feature Navigator

Feature Navigator is a web-based tool that enables you to quickly determine which Cisco IOS software images support a particular set of features and which features are supported in a particular Cisco IOS image.

Feature Navigator is available 24 hours a day, 7 days a week. To access Feature Navigator, you must have an account on Cisco.com. If you have forgotten or lost your account information, e-mail the Contact Database Administration group at cdbadmin@cisco.com. If you do not have an account on Cisco.com, go to <http://www.cisco.com/register> and follow the directions to establish an account.

To use Feature Navigator, you must have a JavaScript-enabled web browser such as Netscape 3.0 or later, or Internet Explorer 4.0 or later. Internet Explorer 4.0 always has JavaScript enabled. To enable JavaScript for Netscape 3.x or Netscape 4.x, follow the instructions provided with the web browser. For JavaScript support and enabling instructions for other browsers, check with the browser vendor.

Feature Navigator is updated when major Cisco IOS software releases and technology releases occur. You can access Feature Navigator at the following URL:

<http://www.cisco.com/go/fn>

Using Software Release Notes

Cisco IOS software releases include release notes that provide the following information:

- Platform support information
- Memory recommendations
- Microcode support information
- Feature set tables
- Feature descriptions
- Open and resolved severity 1 and 2 caveats for all platforms

Release notes are intended to be release-specific for the most current release, and the information provided in these documents may not be cumulative in providing information about features that first appeared in previous releases.



Cisco IOS Mobile Wireless Commands

This book documents all of the Cisco IOS software commands in Cisco IOS Release 12.2(8)YD for the Gateway GPRS Support Node (GGSN) and GTP Director Module (GDM), in alphabetical order.

To locate the group of commands that are applicable to a particular technology area, such as General Packet Radio Service (GPRS), see the chapter, “Cisco IOS GGSN Command Set” in the “Mobile Wireless Commands by Technology” section on page 291.

aaa-accounting

To enable or disable accounting for a particular access point on the GGSN, use the **aaa-accounting** access-point configuration command.

aaa-accounting { **enable** | **disable** }

Syntax Description

enable	Enables accounting on the APN. When you configure an APN for non-transparent access, this is the default value.
disable	Disables accounting on the APN. When you configure an APN for transparent access, this is the default value.

Defaults

enable—For non-transparent APNs
disable—For transparent APNs

Command Modes

Access-point configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

The Cisco Systems GGSN has different defaults for enabling and disabling accounting services for transparent and non-transparent access points:

- If you configure an APN for non-transparent access using the **access-mode** command, the GGSN automatically enables accounting with authentication at the APN.
- If you configure an APN for transparent access, which is the default access mode, the GGSN automatically disables accounting at the APN.

Therefore, if you have configured a transparent access APN and you want to provide accounting at that APN, you need to configure the **aaa-accounting enable** command at the APN.

However, for accounting to occur, you also must complete the configuration by specifying the following other configuration elements on the GGSN:

- Enable AAA services using the **aaa new-model** global configuration command.
- Define a server group with the IP addresses of the RADIUS servers in that group using the **aaa group server** global configuration command.
- Configure the following AAA services:
 - AAA authentication using the **aaa authentication** global configuration command
 - AAA authorization using the **aaa authorization** global configuration command

- AAA accounting using the **aaa accounting** global configuration command as shown in Example 2.
- Assign the type of services that the AAA server group should provide. If you only want the server group to support accounting services, then you need to configure the server for accounting only. You can assign the AAA services to the AAA server groups either at the GPRS global configuration level using the **gprs default aaa-group** command, or at the APN using the **aaa-group** command.
- Configure the RADIUS servers using the **radius-server host** command.

**Note**

For more information about AAA and RADIUS global configuration commands, see the *Cisco IOS Security Command Reference*.

To selectively disable accounting at specific APNs where you do not want that service, use the **aaa-accounting disable** access-point configuration command.

You can verify whether AAA accounting is enabled or disabled at an APN using the **show gprs access-point** command.

There is not a **no** form of this command.

Examples**Example 1**

The following configuration example disables accounting at access-point 1:

```
interface virtual-template 1
  gprs access-point-list abc
!
gprs access-point-list abc
  access-point 1
    access-point-name gprs.pdn.com
    access-mode non-transparent
    aaa-accounting disable
```

Example 2

The following configuration example enables accounting on transparent access-point 4. Accounting is disabled on access-point 5 because it is configured for transparent mode and the **aaa-accounting enable** command is not explicitly configured.

Accounting is automatically enabled on access-point 1 because it has been configured for non-transparent access mode. Accounting is explicitly disabled at access-point 3, because accounting is automatically enabled for non-transparent access mode.

An example of some of the AAA and RADIUS global configuration commands are also shown:

```
aaa new-model
!
aaa group server radius foo
  server 10.2.3.4
  server 10.6.7.8
aaa group server radius foo1
  server 10.10.0.1
aaa group server radius foo2
  server 10.2.3.4
  server 10.10.0.1
aaa group server foo3
  server 10.6.7.8
  server 10.10.0.1
```

```

!
aaa authentication ppp foo group foo
aaa authentication ppp foo2 group foo2
aaa authorization network default group radius
aaa accounting exec default start-stop group foo
aaa accounting network foo1 start-stop group foo1
aaa accounting network foo2 start-stop group foo2
!
gprs access-point-list gprs
  access-point 1
    access-mode non-transparent
    access-point-name www.pdn1.com
    aaa-group authentication foo
  !
  access-point 3
    access-point-name www.pdn2.com
    access-mode non-transparent
    aaa-accounting disable
    aaa-group authentication foo
  !
  access-point 4
    access-point-name www.pdn3.com
    aaa-accounting enable
    aaa-group accounting foo1
  !
  access-point 5
    access-point-name www.pdn4.com
  !
gprs default aaa-group authentication foo2
gprs default aaa-group accounting foo3
!
radius-server host 10.2.3.4 auth-port 1645 acct-port 1646 non-standard
radius-server host 10.6.7.8 auth-port 1645 acct-port 1646 non-standard
radius-server host 10.10.0.1 auth-port 1645 acct-port 1646 non-standard
radius-server key ggsntel

```

Related Commands

Command	Description
aaa accounting	Enables AAA accounting of requested services for billing or security purposes.
aaa authorization	Sets parameters that restrict user access to a network.
aaa group server	Groups different server hosts into distinct lists and distinct methods.
aaa-group	Specifies a RADIUS server group and assigns the type of AAA services to be supported by the server group for a particular access point on the GGSN.
gprs default aaa-group	Specifies a default RADIUS server group and assigns the type of AAA services to be supported by the server group for all access points on the GGSN.
radius-server host	Specifies a RADIUS server host.
show gprs access-point	Displays information about access points on the GGSN.

aaa-group

To specify a AAA server group and assign the type of AAA services to be supported by the server group for a particular access point on the GGSN, use the **aaa-group** access-point configuration command. To remove a AAA server group, use the **no** form of this command.

```
aaa-group {authentication | accounting} server-group
```

```
no aaa-group {authentication | accounting} server-group
```

Syntax Description

authentication	Assigns the selected server group for authentication services on the APN.
accounting	Assigns the selected server group for accounting services only on the APN.
<i>server-group</i>	Specifies the name of a AAA server group to be used for AAA services on the APN.
Note	The name of the AAA server group that you specify must correspond to a server group that you configure using the aaa group server command.

Defaults

No default behavior or values.

Command Modes

Access-point configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

The Cisco Systems GGSN supports authentication and accounting at APNs using AAA server groups. By using AAA server groups, you gain the following benefits:

- You can selectively implement groups of servers for authentication and accounting at different APNs.
- You can configure different server groups for authentication services and accounting services in the same APN.
- You can control which RADIUS services you want to enable at a particular APN, such as AAA accounting.

The GGSN supports the implementation of AAA server groups at both the global and access-point configuration levels. You can minimize your configuration by specifying the configuration that you want to support across most APNs, at the global configuration level. Then, at the access-point configuration level, you can selectively modify the services and server groups that you want to support at a particular APN. Therefore, you can override the AAA server global configuration at the APN configuration level.

To configure a default AAA server group to be used for all APNs on the GGSN, use the **gprs default aaa-group** global configuration command. To specify a different AAA server group to be used at a particular APN for authentication or accounting, use the **aaa-group** access-point configuration command.

If accounting is enabled on the APN, then the GGSN looks for an accounting server group to be used for the APN in the following order:

- First, at the APN for an accounting server group—configured in the **aaa-group accounting** command.
- Second, for a global GPRS default accounting server group—configured in the **gprs default aaa-group accounting** command.
- Third, at the APN for an authentication server group—configured in the **aaa-group authentication** command.
- Last, for a global GPRS default authentication server group—configured in the **gprs default aaa-group authentication** command.

If none of the above commands are configured on the GGSN, then AAA accounting is not performed.

If authentication is enabled on the APN, then the GGSN first looks for an authentication server group at the APN, configured in the **aaa-group authentication** command. If an authentication server group is not found at the APN, then the GGSN looks for a globally configured, GPRS default authentication server group, configured in the **gprs default aaa-group authentication** command.

To complete the configuration, you also must specify the following configuration elements on the GGSN:

- Enable AAA services using the **aaa new-model** global configuration command.
- Configure the RADIUS servers using the **radius-server host** command.
- Define a server group with the IP addresses of the RADIUS servers in that group using the **aaa group server** global configuration command.
- Configure the following AAA services:
 - AAA authentication using the **aaa authentication** global configuration command
 - AAA authorization using the **aaa authorization** global configuration command
 - AAA accounting using the **aaa accounting** global configuration command
- Enable the type of AAA services (accounting and authentication) to be supported on the APN.
 - The GGSN enables accounting by default for non-transparent APNs.

You can enable or disable accounting services at the APN using the **aaa-accounting** command.
 - Authentication is enabled by default for non-transparent APNs. There is not any specific command to enable or disable authentication. Authentication cannot be enabled for transparent APNs.

You can verify the AAA server groups that are configured for an APN using the **show gprs access-point** command.


Note

For more information about AAA and RADIUS global configuration commands, see the *Cisco IOS Security Command Reference*.

Examples

The following configuration example defines four AAA server groups on the GGSN: foo, foo1, foo2, and foo3, shown by the **aaa group server** commands.

Using the **gprs default aaa-group** command, two of these server groups are globally defined as default server groups: foo2 for authentication, and foo3 for accounting.

At access-point 1, which is enabled for authentication, the default global authentication server group of foo2 is overridden and the server group named foo is designated to provide authentication services on the APN. Notice that accounting services are not explicitly configured at that access point, but are automatically enabled because authentication is enabled. Because there is a globally defined accounting server-group defined, the server named foo3 will be used for accounting services.

At access-point 2, which is enabled for authentication, the default global authentication server group of foo2 is used. Because there is a globally defined accounting server-group defined, the server named foo3 will be used for accounting services.

At access-point 4, which is enabled for accounting using the **aaa-accounting enable** command, the default accounting server group of foo3 is overridden and the server group named foo1 is designated to provide accounting services on the APN.

Access-point 5 does not support any AAA services because it is configured for transparent access mode, and accounting is not enabled.

```

aaa new-model
!
aaa group server radius foo
  server 10.2.3.4
  server 10.6.7.8
aaa group server radius foo1
  server 10.10.0.1
aaa group server radius foo2
  server 10.2.3.4
  server 10.10.0.1
aaa group server foo3
  server 10.6.7.8
  server 10.10.0.1
!
aaa authentication ppp foo group foo
aaa authentication ppp foo2 group foo2
aaa authorization network default group radius
aaa accounting exec default start-stop group foo
aaa accounting network foo1 start-stop group foo1
aaa accounting network foo2 start-stop group foo2
aaa accounting network foo3 start-stop group foo3
!
gprs access-point-list gprs
  access-point 1
    access-mode non-transparent
    access-point-name www.pdn1.com
    aaa-group authentication foo
  !
  access-point 2
    access-mode non-transparent
    access-point-name www.pdn2.com
  !
  access-point 4
    access-point-name www.pdn4.com
    aaa-accounting enable
    aaa-group accounting foo1
  !
  access-point 5
    access-point-name www.pdn5.com
  !

```

■ aaa-group

```

gprs default aaa-group authentication foo2
gprs default aaa-group accounting foo3
!
radius-server host 10.2.3.4 auth-port 1645 acct-port 1646 non-standard
radius-server host 10.6.7.8 auth-port 1645 acct-port 1646 non-standard
radius-server host 10.10.0.1 auth-port 1645 acct-port 1646 non-standard
radius-server key ggsntel

```

Related Commands

Command	Description
aaa accounting	Enables AAA accounting of requested services for billing or security purposes.
aaa authorization	Sets parameters that restrict user access to a network.
aaa group server	Groups different server hosts into distinct lists and distinct methods.
aaa-accounting	Enables or disables accounting for a particular access point on the GGSN.
gprs default aaa-group	Specifies a default RADIUS server group and assigns the type of AAA services to be supported by the server group for all access points on the GGSN.
radius-server host	Specifies a RADIUS server host.
show gprs access-point	Displays information about access points on the GGSN.

access-mode

To specify whether the GGSN requests user authentication at the access point to a PDN, use the **access-mode** access-point configuration command. To remove an access mode and return to the default value, use the **no** form of this command.

```
access-mode {transparent | non-transparent}
```

```
no access-mode {transparent | non-transparent}
```

Syntax Description

transparent	Specifies that the users who access the PDN through the access point associated with the current virtual template are allowed access without authorization or authentication.
non-transparent	Specifies that the users who access the PDN through the current virtual template must be authenticated by the GGSN acting as a proxy for the authentication.

Defaults

transparent

Command Modes

Access-point configuration

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **access-mode** command to specify whether users accessing a PDN through a particular access point associated with the virtual template interface have transparent or non-transparent access to the network.

Transparent access means that users who access the PDN through the current virtual template are granted access without further authentication.

Non-transparent access means that users who access the PDN through the current virtual template must be authenticated by the GGSN. You must configure non-transparent access to support RADIUS services at an access point. Authentication is performed by the GGSN while establishing the PDP context.

Examples

Example 1

The following example specifies non-transparent access to the PDN, gprs.pdn.com, through access-point 1:

```
interface virtual-template 1
 gprs access-point-list abc
```

```

!
gprs access-point-list abc
  access-point 1
    access-point-name gprs.pdn.com
    access-mode non-transparent

```

Example 2

The following example specifies transparent access to the PDN, gprs.pdn2.com, through access-point 2:

```

interface virtual-template 1
  gprs access-point-list abc
!
gprs access-point-list abc
  access-point 2
    access-point-name gprs.pdn2.com

```



Note

Because transparent is the default access mode, it does not appear in the output of the **show running-configuration** command for the access point.

Related Commands

Command	Description
aaa-group	Specifies a AAA server group and assigns the type of AAA services to be supported by the server group for a particular access point on the GGSN.
access-point	Specifies an access-point number and enters access-point configuration mode.
gprs default aaa-group	Specifies a default AAA server group and assigns the type of AAA services to be supported by the server group for all access points on the GGSN.

access-point

To specify an access point number and enter access-point configuration mode, use the **access-point** access-point list configuration command. To remove an access point number, use the **no** form of this command.

access-point *access-point-index*

no access-point *access-point-index*

Syntax Description

access-point-index Integer from 1 to 65535 that identifies a GPRS access point.

Defaults

No default behavior or values.

Command Modes

Access-point list configuration

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **access-point** command to create an access point to a PDN.

To configure an access point, first set up an access-point list using the **gprs access-point-list** command and then add the access point to the access-point list.

You can specify access point numbers in any sequence.



Note

Memory constraints might occur if you define a large number of access points to support VPN Routing and Forwarding (VRF).

Examples

The following example configures an access point with an index number of 7 in an access-point-list named "abc" on the GGSN:

```
gprs access-point-list abc
 access-point 7
```

Related Commands	Command	Description
	access-point-name	Specifies the network (or domain) name for a PDN that users can access from the GGSN at a defined access point.
	gprs access-point-list	Configures an access point list that you use to define PDN access points on the GGSN.

access-point-name

To specify the network (or domain) name for a PDN that users can access from the GGSN at a defined access point, use the **access-point-name** access-point configuration command. To remove an access point name, use the **no** form of this command.

access-point-name *apn-name*

no access-point-name *apn-name*

Syntax Description

<i>apn-name</i>	Specifies the network or domain name of the private data network that can be accessed through the current access point.
-----------------	---

Defaults

There is no default value for this command.

Command Modes

Access-point configuration

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **access-point-name** command to specify the PDN name of a network that can be accessed through a particular access point. An access-point name is mandatory for each access point.

To configure an access point, first set up an access-point list using the **gprs access-point-list** command and then add the access point to the access-point list.

The access-point name typically is the domain name of the service provider that users access, for example, www.isp.com.

Examples

The following example specifies the access-point name for a network:

```
access-point 1
 access-point-name www.isp.com
 exit
```

Related Commands

Command	Description
access-point	Specifies an access point number and enters access-point configuration mode.

access-type

To specify whether an access point is real or virtual on the GGSN, use the **access-type** access-point configuration command. To return to the default value, use the **no** form of this command.

access-type {virtual | real}

no access-type {virtual | real}

Syntax Description	virtual	real
	Specifies an APN type that is not associated with any specific physical target network on the GGSN.	Specifies an APN type that corresponds to an external physical network to a PDN on the GGSN. This is the default value.

Defaults real

Command Modes Access-point configuration

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **access-type** command to specify whether an access point is real or virtual on the GGSN. You only need to configure this command for virtual access types.

Virtual access types are used to configure virtual APN support on the Cisco Systems GGSN to minimize provisioning issues in other GPRS network entities that require configuration of APN information. Using the virtual APN feature on the Cisco Systems GGSN, HLR subscription data can simply provide the name of the virtual APN. User's can still request access to specific target networks that are accessible by the GGSN without requiring each of those destination APNs to be provisioned at the HLR.

The default keyword, **real**, identifies a physical target network that the GGSN can reach. Real APNs must always be configured on the GGSN to reach external networks. Virtual APNs can be configured in addition to real access points to ease provisioning in the GPRS PLMN.

No other access-point configuration commands are applicable if the access type is virtual.

Examples The following example shows configuration of a virtual access point type and a real access point type:

```
access-point 1
  access-point-name corporate
  access-type virtual
exit
access-point 2
  access-point-name corporatea.com
```

```
ip-address-pool dhcp-client  
dhcp-server 10.21.21.1
```

Related Commands

Command	Description
access-point	Specifies an access point number and enters access-point configuration mode.
access-point-name	Specifies the network (or domain) name for a PDN that users can access from the GGSN at a defined access point.

access-violation deactivate-pdp-context

To specify that a user's session be ended and the user packets discarded when a user attempts unauthorized access to a PDN through an access point, use the **access-violation deactivate-pdp-context** command. To return to the default value, use the **no** form of this command.

access-violation deactivate-pdp-context

no access-violation deactivate-pdp-context

Syntax Description This command has no arguments or keywords.

Defaults The user's session remains active and the user packets are discarded.

Command Modes Access-point configuration

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW and the discard-packets option was removed.

Usage Guidelines

Use the **access-violation deactivate-pdp-context** command to specify the action that is taken if a user attempts unauthorized access through the specified access point.

The default is that the GGSN simply drops user packets when an unauthorized access is attempted. However, if you specify **access-violation deactivate-pdp-context**, the GGSN terminates the user's session in addition to discarding the packets.

Examples

The following example shows deactivation of a user's access in addition to discarding the user packets:

```
access-point 1
 access-point-name pdn.aaaa.com
 ip-access-group 101 in
 access-violation deactivate-pdp-context
 exit
```

Related Commands

Command	Description
access-point-name	Specifies the network (or domain) name for a PDN that users can access from the GGSN at a defined access point.

aggregate

To configure the GGSN to create an aggregate route in its IP routing table, when receiving PDP requests from MSs on the specified network, for a particular access point on the GGSN, use the **aggregate** access-point configuration command. To remove an aggregate route, use the **no** form of this command.

```
aggregate { auto | ip-network-prefix{/mask-bit-length | ip-mask} }
```

```
no aggregate { auto | ip-network-prefix{/mask-bit-length | ip-mask} }
```

Syntax Description

auto	IP address mask sent by the DHCP or RADIUS server is used by the access point for route aggregation.
<i>ip-network-prefix</i>	Dotted decimal notation of the IP network address to be used by the GGSN for route aggregation, in the format <i>a.b.c.d</i> .
<i>mask-bit-length</i>	Number of bits (as an integer) that represent the network portion of the specified IP network address. A forward slash is required before the integer. Note There is no space between the <i>ip-network-prefix</i> and the slash (/).
<i>ip-mask</i>	Dotted decimal notation of the IP network mask (in the format <i>e.f.g.h.</i>), which represents the network and host portion of the specified IP network address.

Defaults

No default behavior or values.

Command Modes

Access-point configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

The GGSN uses a static host route to forward user data packets received from the Gi interface to the Gn interface using the virtual template interface of the GTP tunnel.

Without the **aggregate** command or **gprs default aggregate** command, the GGSN creates a static host route for each PDP context. For example, for 45,000 PDP contexts supported, the GGSN creates 45,000 static host routes in its IP routing table.

You can use the **aggregate** command to reduce the number of static routes implemented by the GGSN for PDP contexts at a particular access point. The **aggregate** command allows you to specify an IP network prefix to combine the routes of PDP contexts from the same network as a single route on the GGSN.

To configure the GGSN to automatically aggregate routes that are returned by a DHCP or RADIUS server, use the **aggregate auto** command at the APN. Automatic route aggregation can be configured at the access-point configuration level only on the GGSN. The **gprs default aggregate** global configuration command does not support the **auto** option; therefore, you cannot configure automatic route aggregation globally on the GGSN.

You can specify multiple **aggregate** commands at each access point to support multiple network aggregates. However, if you use the **aggregate auto** command at the APN, you cannot specify any other aggregate route ranges at the APN. If you need to handle other static route cases at the APN, then you will have to use the **gprs default aggregate** global configuration command.

To globally define an aggregate IP network address range for all access points on the GGSN for statically derived addresses, you can use the **gprs default aggregate** command. Then, you can use the **aggregate** command to override this default address range at a particular access point.

The GGSN responds in the following manner to manage routes for MSs through an access point, when route aggregation is configured in the following scenarios:

- No aggregation is configured on the GGSN, at the APN or globally—The GGSN inserts the 32-bit host route of the MS into its routing table as a static route.
- A default aggregate route is configured globally, but no aggregation is configured at the APN:
 - If a statically or dynamically derived address for an MS matches the default aggregate route range, the GGSN inserts an aggregate route into its routing table.
 - If the MS address does not match the default aggregate route, the GGSN inserts the 32-bit host route as a static route into the routing table.
- A default aggregate route is configured globally, and automatic route aggregation is configured at the APN:
 - If a statically derived address for an MS matches the default aggregate route range, the GGSN inserts an aggregate route into its routing table.
 - If a statically derived address for an MS does not match the default aggregate route, the GGSN inserts the 32-bit host route as a static route into its routing table.
 - If a dynamically derived address for an MS is received, the GGSN aggregates the route based on the address and mask returned by the DHCP or RADIUS server.
- A default aggregate route is configured globally, and an aggregate route is also configured at the APN:
 - If a statically or dynamically derived address for an MS matches the aggregate range at the APN through which it was processed, or otherwise matches the default aggregate range, the GGSN inserts an aggregate route into its routing table.
 - If a statically or dynamically derived address for an MS does not match either the aggregate range at the APN, or the global default aggregate range, the GGSN inserts the 32-bit host route as a static route into its routing table.

Use care when assigning IP addresses to an MS before you configure the aggregation ranges on the GGSN. A basic guideline is to aggregate as many addresses as possible, but to minimize your use of aggregation with respect to the total amount of IP address space being used by the access point.



The **aggregate** command and **gprs default aggregate** commands affect routing on the GGSN. Use care when planning and configuring IP address aggregation.

Use the **show gprs access-point** command to display information about the aggregate routes that are configured on the GGSN. The aggregate output field appears only when aggregate routes have been configured on the GGSN, or the **auto** option is configured.

Use the **show ip route** command to verify whether the static route is in the current IP routing table on the GGSN. The static route created for any PDP requests (aggregated or non-aggregated) appears with the code “U” in the routing table indicating a per-user static route.

**Note**

The **show ip route** command only displays a static route for aggregated PDP contexts if PDP contexts on that network have been created on the GGSN. If you configure route aggregation on the GGSN, but no PDP requests have been received for that network, the static route does not appear.

Examples**Example 1**

The following example specifies two aggregate network address ranges for access point 8. The GGSN will create aggregate routes for PDP context requests received from MSs with IP addresses on the networks 172.16.0.0 and 10.0.0.0:

```
gprs access-point-list gprs
  access-point 8
    access-point-name pdn.aaaa.com
    aggregate 172.16.0.0/16
    aggregate 10.0.0.0/8
```

**Note**

Regardless of the format in which you configure the **aggregate** command, the output from the **show running-configuration** command always displays the network in the dotted decimal/integer notation.

Example 2

The following example shows a route aggregation configuration for access point 8 using DHCP on the GGSN, along with the associated output from the **show gprs gtp pdp-context all** command and the **show ip route** commands.

Notice that the **aggregate auto** command is configured at the access point where DHCP is being used. The **dhcp-gateway-address** command specifies the subnet addresses to be returned by the DHCP server. This address should match the IP address of a loopback interface on the GGSN. In addition, to accommodate route aggregation for another subnet 10.80.0.0, the **gprs default aggregate** global configuration command is used.

In this example, the GGSN aggregates routes for dynamically derived addresses for MSs through access point 8 based upon the address and mask returned by the DHCP server. For PDP context requests received for statically derived addresses on the 10.80.0.0 network, the GGSN also implements an aggregate route into its routing table, as configured by the **gprs default aggregate** command.

```
interface Loopback0
  ip address 10.80.0.1 255.255.255.255
!
interface Loopback2
  ip address 10.88.0.1 255.255.255.255
!
gprs access-point-list gprs
  access-point 8
    access-point-name pdn.aaaa.com
    ip-address-pool dhcp-proxy-client
    aggregate auto
    dhcp-server 172.16.43.35
```

```

    dhcp-gateway-address 10.88.0.1
    exit
!
gprs default aggregate 10.80.0.0 255.255.255.0

```

In the following output for the **show gprs gtp pdp-context all** command, 5 PDP context requests are active on the GGSN for pdn.aaaa.com from the 10.88.0.0/24 network:

```

router# show gprs gtp pdp-context all
TID           MS Addr           Source  SGSN Addr         APN
6161616161610001 10.88.0.1         DHCP    172.16.123.1     pdn.aaaa.com
6161616161610002 10.88.0.2         DHCP    172.16.123.1     pdn.aaaa.com
6161616161610003 10.88.0.3         DHCP    172.16.123.1     pdn.aaaa.com
6161616161610004 10.88.0.4         DHCP    172.16.123.1     pdn.aaaa.com
6161616161610005 10.88.0.5         DHCP    172.16.123.1     pdn.aaaa.com

```

The following output for the **show ip route** command shows a single static route in the IP routing table for the GGSN, which routes the traffic for the 10.88.0.0/24 subnet through the virtual template (or Virtual-Access1) interface:

```

Router# show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter
area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

    10.80.0.0/16 is subnetted, 1 subnets
C       10.80.0.0 is directly connected, Loopback0
    10.113.0.0/16 is subnetted, 1 subnets
C       10.113.0.0 is directly connected, Virtual-Access1
    172.16.0.0/16 is variably subnetted, 3 subnets, 3 masks
C       172.16.43.192/28 is directly connected, FastEthernet0/0
S       172.16.43.0/24 is directly connected, FastEthernet0/0
S       172.16.43.35/32 is directly connected, Ethernet2/3
    10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
U       10.88.0.0/24 [1/0] via 0.0.0.0, Virtual-Access1
C       10.88.0.0/16 is directly connected, Loopback2

```

Related Commands

Command	Description
gprs default aggregate	Configures the GGSN to create an aggregate route in its IP routing table when receiving PDP requests from MSs on the specified network for any access point on the GGSN.
show gprs access-point	Displays information about access points on the GGSN.
show ip route	Displays all static IP routes, or those installed using the AAA route download function.

anonymous user

To configure anonymous user access at an access point, use the **anonymous user** access-point configuration command. To remove the username configuration, use the **no** form of this command.

anonymous user *username* [*password*]

no anonymous user *username* [*password*]

Syntax Description

<i>username</i>	Alphanumeric string identifying user. The username argument can be only one word. It can contain any combination of numbers and characters.
<i>password</i>	Alphanumeric string. The password argument can be only one word. It can contain any combination of numbers and characters.

Defaults

No default behavior or values.

Command Modes

Access-point configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use this command to allow a mobile station (MS) to access a non-transparent mode APN without supplying the username and password in the GTP protocol configuration option (PCO) information element (IE) of the create PDP context request message. The GGSN will use the username and password configured on the APN for the user session.

This command enables anonymous access, which means that a PDP context can be created by an MS to a specific host without specifying a username and password.

Examples

The following example specifies the username george and the password abcd123 for anonymous access at access point 49:

```
gprs access-point-list abc
access-point 49
access-point-name www.pdn.com
anonymous user george abcd123
```

block-foreign-ms

To restrict GPRS access based on the mobile user's home PLMN (where the MCC and MNC are used to determine the point of origin), use the **block-foreign-ms** access-point configuration command. To disable blocking of foreign subscribers, use the **no** form of this command.

block-foreign-ms

no block-foreign-ms

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Access-point configuration

Command History	Release	Modification
	12.2(8)YD	This command was introduced.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines The **block-foreign-ms** command enables the GGSN to block foreign MSs from accessing the GGSN. When you use this command, the GGSN determines if an MS is inside or outside of the PLMN based on the mobile country code (MCC) and mobile network code (MNC). The MCC and MNC are specified using the **gprs mcc mnc** command.



Note The MCC and MNC values used to determine whether a request is from a roaming MS must be configured using the **gprs mcc mnc** global configuration command before the GGSN can be enabled to block foreign mobile stations.

Examples The following example blocks access to foreign MSs at access point 49:

```
gprs access-point-list abc
access-point 49
  access-point-name www.pdn.com
  block-foreign-ms
```

Related Commands	Command	Description
	gprs mcc mnc	Configures the mobile country code and mobile network code that the GGSN uses to determine whether a create PDP context request is from a foreign MS.

clear gprs access-point statistics

To clear statistics counters for a specific access point or for all access points on the GGSN, use the **clear gprs access-point statistics** privileged EXEC command.

clear gprs access-point statistics {*access-point-index* | **all**}

Syntax Description

<i>access-point-index</i>	Index number of an access point. Information about that access point is cleared.
all	Information about all access points on the GGSN is cleared.

Defaults

No default behavior or values.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

This command clears the statistics that are displayed by the **show gprs access-point statistics** command.

Examples

The following example clears the statistics at access point 2:

```
clear gprs access-point statistics 2
```

The following example clears the statistics for all access points:

```
clear gprs access-point statistics all
```

Related Commands

Command	Description
show gprs access-point statistics	Displays data volume and PDP context activation and deactivation statistics for access points on the GGSN.

clear gprs charging cdr

To clear GPRS call detail records (CDRs), use the **clear gprs charging cdr** privileged EXEC configuration command.

```
clear gprs charging cdr {access-point access-point-index | all | partial-record | tid tunnel-id}
```

Syntax Description

access-point <i>access-point-index</i>	Closes CDRs for a specified access-point index.
all	Closes all CDRs on the GGSN.
partial-record	Closes all CDRs, and opens partial CDRs for any existing PDP contexts.
tid <i>tunnel-id</i>	Closes CDRs by tunnel ID.

Defaults

No default behavior or values.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX and the partial-record keyword was added.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **clear gprs charging cdr** command to clear the CDRs for one or more PDP contexts.

To clear CDRs by tunnel ID (TID), use the **clear gprs charging cdr** command with the **tid** keyword and specify the corresponding TID for which you want to clear the CDRs. To determine the tunnel ID (TID) of an active PDP context, you can use the **show gprs gtp pdp-context all** command to obtain a list of the currently active PDP contexts (mobile sessions).

To clear CDRs by access point, use the **clear gprs charging cdr** command with the **access-point** keyword and specify the corresponding access-point index for which you want to clear CDRs. To obtain a list of access points, you can use the **show gprs access-point** command.

When you clear CDRs for a TID, an access point, or for all access points, charging data records for the specified TID or access point(s) are sent immediately to the charging gateway. When you run these versions of this command, the following things occur:

- The GGSN no longer sends charging data that has been accumulated for the PDP context to the charging gateway.
- The GGSN closes the current CDRs for the specified PDP contexts.
- The GGSN no longer generates CDRs for existing PDP contexts.

To close all CDRs and open partial CDRs for existing PDP contexts on the GGSN, use the **clear gprs charging cdr partial-record** command.

The **clear gprs charging cdr** command is normally used before disabling the charging function.

Examples

The following example shows how to clear CDRs by tunnel ID:

```
router# show gprs gtp pdp-context all
TID           MS Addr      Source  SGSN Addr  APN
1234567890123456 10.11.1.1   Radius  10.4.4.11 www.pdn1.com
2345678901234567 Pending      DHCP    10.4.4.11 www.pdn2.com
3456789012345678 10.21.1.1   IPCP    10.1.4.11 www.pdn3.com
4567890123456789 10.31.1.1   IPCP    10.1.4.11 www.pdn4.com
5678901234567890 10.41.1.1   Static  10.4.4.11 www.pdn5.com

router# clear gprs gtp charging cdr tid 1234567890123456
```

The following example shows how to clear CDRs for access point 1:

```
router# clear gprs charging cdr access-point 1
```

Related Commands

Command	Description
show gprs charging statistics	Displays current statistics about the transfer of charging packets between the GGSN and charging gateways.
show gprs access-point	Displays information about an access point.

clear gprs gtp pdp-context

To clear one or more PDP contexts (mobile sessions), use the **clear gprs gtp pdp-context** privileged EXEC configuration command.

```
clear gprs gtp pdp-context {tid tunnel-id | imsi imsi_value | path ip-address [remote_port_num] | access-point access-point-index | all}
```

Syntax Description	Parameter	Description
	tid <i>tunnel-id</i>	Tunnel ID (TID) for which PDP contexts are to be cleared.
	imsi <i>imsi_value</i>	International Mobile Subscriber Identity (IMSI) value for which PDP contexts are to be cleared.
	path <i>ip-address</i> [<i>remote_port_num</i>]	Remote SGSN IP address for which all PDP contexts associated with the SGSN are to be cleared. Optionally, the remote SGSN IP address and remote port number for which all PDP contexts are to be cleared.
	access-point <i>access-point-index</i>	Access-point index for which PDP contexts are to be cleared.
	all	Clear all currently active PDP contexts.

Defaults No default behavior or values.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **clear gprs gtp pdp-context** command to clear one or more PDP contexts (mobile sessions). Use this command when operator intervention is required for administrative reasons—for example, when there are problematic user sessions or the system must be taken down for maintenance.

After the **clear gprs gtp pdp-context** command is issued, those users who are accessing the PDN through the specified TID, IMSI, path, or access point are disconnected.

To determine the tunnel ID of an active PDP context, you can use the **show gprs gtp pdp-context** command to obtain a list of the currently active PDP contexts (mobile sessions). Then, to clear a PDP context by tunnel ID, use the **clear gprs gtp pdp-context** command with the **tid** keyword and the corresponding tunnel ID that you want to clear.

To clear PDP contexts by access point, use the **clear gprs gtp pdp-context** command with the **access-point** keyword and the corresponding access-point index. To display a list of access points that are configured on the GGSN, use the **show gprs access-point** command.

If you know the IMSI of the PDP context, you can use the **clear gprs gtp pdp-context** with the **imsi** keyword and the corresponding IMSI of the connected user to clear the PDP context. If you want to determine the IMSI of a PDP context, you can use the **show gprs gtp pdp-context all** command to display a list of the currently active PDP contexts. Then, after finding the TID value that corresponds to the session that you want to clear, you can use the **show gprs gtp pdp-context tid** command to display the IMSI.

Examples

The following example shows how to clear PDP contexts by tunnel ID:

```
router# show gprs gtp pdp-context all
TID      MS Addr      Source  SGSN Addr    APN
1234567890123456 10.11.1.1    Radius  10.4.4.11    www.pdn1.com
2345678901234567 Pending      DHCP    10.4.4.11    www.pdn2.com
3456789012345678 10.21.1.1    IPCP    10.1.4.11    www.pdn3.com
4567890123456789 10.31.1.1    IPCP    10.1.4.11    www.pdn4.com
5678901234567890 10.41.1.1    Static  10.4.4.11    www.pdn5.com

router# clear gprs gtp pdp-context tid 1234567890123456
```

The following example shows how to clear PDP contexts at access point 1:

```
router# clear gprs gtp pdp-context access-point 1
```

clear gprs gtp statistics

To clear the current GPRS GTP statistics, use the **clear gprs gtp statistics** privileged EXEC configuration command.

clear gprs gtp statistics

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **clear gprs gtp statistics** command to clear the current GPRS GTP statistics. This command clears the counters that are displayed by the **show gprs gtp statistics** command.



Note

The **clear gprs gtp statistics** command does not clear the counters that are displayed by the **show gprs gtp status** command.

Examples The following example clears the GPRS GTP statistics:

```
router# clear gprs gtp statistics
```

clear gprs gtp-director statistics

To clear the current counters for GTP Director Module (GDM) statistics, use the **clear gprs gtp-director statistics** privileged EXEC configuration command.

clear gprs gtp-director statistics

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **clear gprs gtp-director statistics** command to clear all of the counters that are displayed by the **show gprs gtp-director statistics** command.

Examples The following example clears the GDM counters:

```
router# clear gprs gtp-director statistics
```

Related Commands	Command	Description
	show gprs gtp-director statistics	Displays the current statistics for requests received and processed by GDM.

dhcp-gateway-address

To specify the subnet in which the DHCP server should return addresses for DHCP requests for MS users entering a particular PDN access point, use the **dhcp-gateway-address** access-point configuration command. To remove a DHCP gateway address and return to the default, use the **no** form of this command.

dhcp-gateway-address *ip-address*

no dhcp-gateway-address *ip-address*

Syntax Description

<i>ip-address</i>	The IP address of the DHCP gateway to be used in DHCP requests for users who connect through the specified access point.
-------------------	--

Defaults

When you do not configure a **dhcp-gateway-address**, the GGSN uses the virtual template interface address as the DHCP gateway address.

Command Modes

Access-point configuration

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

The **dhcp-gateway-address** specifies the value of the giaddr field that is passed in DHCP messages between the GGSN and the DHCP server. If you do not specify a DHCP gateway address, the address assigned to the virtual template is used.

Though a default value for the virtual template address will occur, you should configure another value for the **dhcp-gateway-address** command whenever you are implementing DHCP services at an access point.

If the access point is configured for VRF, then the dynamic (or static addresses) returned for MSs of PDP contexts at the access point will also be part of that VRF address space. If the DHCP server is located within the VRF address space, then the corresponding loopback interface for the **dhcp-gateway-address** must also be configured within the VRF address space.

Examples

The following example specifies an IP address of 10.88.0.1 for the giaddr field (the **dhcp-gateway-address**) of DHCP server requests. Note that the IP address of a loopback interface, in this case Loopback2, matches the IP address specified in the **dhcp-gateway-address** command. This is required for proper configuration of DHCP on the GGSN.

```
interface Loopback2
 ip address 10.88.0.1 255.255.255.255
!
gprs access-point-list gprs
 access-point 8
  access-point-name pdn.aaaa.com
  ip-address-pool dhcp-proxy-client
  aggregate auto
  dhcp-server 172.16.43.35
  dhcp-gateway-address 10.88.0.1
 exit
```

Related Commands

Command	Description
dhcp-server	Specifies a primary (and backup) DHCP server to allocate IP addresses to MS users entering a particular PDN access point.
gprs default ip-address-pool	Specifies a dynamic address allocation method using IP address pools for the GGSN.
ip-address-pool	Specifies a dynamic address allocation method using IP address pools for the current access point.

dhcp-server

To specify a primary (and backup) DHCP server to allocate IP addresses to MS users entering a particular PDN access point, use the **dhcp-server** access-point configuration command. To remove the DHCP server from the access-point configuration, use the **no** form of this command.

```
dhcp-server {ip-address} [ip-address] [vrf]
```

```
no dhcp-server {ip-address} [ip-address] [vrf]
```

Syntax Description

<i>ip-address</i>	IP address of a DHCP server. The first <i>ip-address</i> argument specifies the IP address of the primary DHCP server. The second (optional) <i>ip-address</i> argument specifies the IP address of a backup DHCP server.
vrf	DHCP server uses the VPN routing and forwarding (VRF) table that is associated with the APN.

Defaults

Global routing table

Command Modes

Access-point configuration

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX, with the following changes: <ul style="list-style-type: none"> The vrf keyword was added. The <i>name</i> argument, as an option for a hostname in place of the IP address of a host, has been removed.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

To configure DHCP on the GGSN, you must configure either the **gprs default ip-address-pool** global configuration command, or the **ip-address-pool** access-point configuration command with the **dhcp-proxy-client** keyword option.

After you configure the access point for DHCP proxy client services, use the **dhcp-server** command to specify a DHCP server.

Use the *ip-address* argument to specify the IP address of the DHCP server. The second, optional *ip-address* argument can be used to specify the IP address of a backup DHCP server to be used in the event that the primary DHCP server is unavailable. If you do not specify a backup DHCP server, then no backup DHCP server is available.

The DHCP server can be specified in two ways:

- At the global configuration level, using the **gprs default dhcp-server** command.
- At the access-point configuration level, using the **dhcp-server** command.

If you specify a DHCP server at the access-point level using the **dhcp-server** command, then the server address specified at the access point overrides the address specified at the global level. If you do not specify a DHCP server address at the access-point level, then the address specified at the global level is used.

Therefore, you can have a global address setting and also one or more local access-point level settings if you need to use different DHCP servers for different access points.

Use the **vrf** keyword when the DHCP server itself is located within the address space of a VRF interface on the GGSN. If the DHCP server is located within the VRF address space, then the corresponding loopback interface for the **dhcp-gateway-address** must also be configured within the VRF address space.

Examples

Example 1

The following example specifies both primary and backup DHCP servers to allocate IP addresses to mobile station users through a non-VPN access point. Because the **vrf** keyword is not configured, the default global routing table is used. The primary DHCP server is located at IP address 10.60.0.1, and the secondary DHCP server is located at IP address 10.60.0.2:

```
access-point 2
access-point-name xyz.com
dhcp-server 10.60.0.1 10.60.0.2
dhcp-gateway-address 10.60.0.1
exit
```

Example 2

The following example shows a VRF configuration for vpn3 (without tunneling) using the **ip vrf** global configuration command. Because the **ip vrf** command establishes both VRF and CEF routing tables, notice that **ip cef** also is configured at the global configuration level to enable CEF switching at all of the interfaces.

The following other configuration elements must also associate the same VRF named vpn3:

- FastEthernet0/0 is configured as the Gi interface using the **ip vrf forwarding** interface configuration command.
- Access-point 2 implements VRF using the **vrf** command access-point configuration command.

The DHCP server at access-point 2 also is configured to support VRF. Notice that access-point 1 uses the same DHCP server, but is not supporting the VRF address space. The IP addresses for access-point 1 will apply to the global routing table:

```
aaa new-model
!
aaa group server radius foo
server 10.2.3.4
server 10.6.7.8
!
aaa authentication ppp foo group foo
aaa authorization network default group radius
aaa accounting exec default start-stop group foo
!
ip cef
!
```

```
ip vrf vpn3
 rd 300:3
!
interface Loopback1
 ip address 10.30.30.30 255.255.255.255
!
interface Loopback2
 ip vrf forwarding vpn3
 ip address 10.27.27.27 255.255.255.255
!
interface FastEthernet0/0
 ip vrf forwarding vpn3
 ip address 10.50.0.1 255.255.0.0
 duplex half
!
interface FastEthernet1/0
 ip address 10.70.0.1 255.255.0.0
 duplex half
!
interface loopback 1
 ip address 10.8.0.1 255.255.255.0
!
interface Virtual-Template1
 ip unnumber loopback 1
 encapsulation gtp
 gprs access-point-list gprs
!
ip route 10.10.0.1 255.255.255.255 Virtual-Template1
ip route vrf vpn3 10.100.0.5 255.255.255.0 fa0/0 10.50.0.2
ip route 10.200.0.5 255.255.255.0 fa1/0 10.70.0.2
!
no ip http server
!
gprs access-point-list gprs
 access-point 1
  access-point-name gprs.pdn.com
  ip-address-pool dhcp-proxy-client
  dhcp-server 10.200.0.5
  dhcp-gateway-address 10.30.30.30
  network-request-activation
  exit
!
 access-point 2
  access-point-name gprs.pdn2.com
  access-mode non-transparent
  ip-address-pool dhcp-proxy-client
  dhcp-server 10.100.0.5 10.100.0.6 vrf
  dhcp-gateway-address 10.27.27.27
  aaa-group authentication foo
  vrf vpn3
  exit
!
gprs default ip-address-pool dhcp-proxy-client
gprs gtp ip udp ignore checksum
!
radius-server host 10.2.3.4 auth-port 1645 acct-port 1646 non-standard
radius-server host 10.6.7.8 auth-port 1645 acct-port 1646 non-standard
radius-server key ggsntel
```

Related Commands	Command	Description
	dhcp-gateway-address	Specifies the subnet in which the DHCP server should return addresses for DHCP requests for MS users entering a particular PDN access point.
	ip-address-pool	Specifies a dynamic address allocation method using IP address pools for the current access point.
	vrf	Configures VPN routing and forwarding at a GGSN access point and associates the access point with a particular VRF instance.

encapsulation gtp

To specify the GPRS tunneling protocol (GTP) as the encapsulation type for packets transmitted over the virtual template interface, use the **encapsulation gtp** interface configuration command. To remove the GTP encapsulation type and return to the default, use the **no** form of this command.

encapsulation gtp

no encapsulation gtp

Syntax Description This command has no arguments or keywords.

Defaults PPP encapsulation

Command Modes Interface configuration

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **encapsulation gtp** command to specify the GTP as the encapsulation type for a virtual template. This is a mandatory setting for both the GGSN and GDM.

Examples

The following example specifies the GPRS tunneling protocol (GTP) as the encapsulation type:

```
interface virtual-template 1
 ip unnumbered loopback 1
 no ip directed-broadcast
 encapsulation gtp
```

gprs access-point-list

To configure an access point list that you use to define PDN access points on the GGSN, use the **gprs access-point-list** global configuration command. To remove an existing access-point list, use the **no** form of this command.

gprs access-point-list *list_name*

no gprs access-point-list *list_name*

Syntax Description	<i>list_name</i>	The name of the access-point list.
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Defaults	No access-point list is defined
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Command Modes	Global configuration
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Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines	Use the gprs access-point-list command to configure an access list that you use to define PDN access points on the GGSN. Currently, only one access list can be defined per virtual template.
------------------	--

Examples	The following example sets up an access list that is used to define two GPRS access points:
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```
! Virtual Template configuration
interface virtual-template 1
 ip unnumber loopback 1
 no ip directed-broadcast
 encapsulation gtp
 gprs access-point-list abc
!
! Access point list configuration
gprs access-point-list abc
 access-point 1
  access-point-name gprs.somewhere.com
  exit
!
 access-point 2
  access-point-name xyz.com
  exit
```

Related Commands	Command	Description
	access-point	Specifies an access point number and enters access-point configuration mode.

gprs canonical-qos best-effort bandwidth-factor

To specify the bandwidth factor to be applied to the canonical best-effort Quality of Service (QoS) class, use the **gprs canonical-qos best-effort bandwidth-factor** global configuration command. To return to the default value, use the **no** form of this command.

gprs canonical-qos best-effort bandwidth-factor *bandwidth-factor*

no gprs canonical-qos best-effort bandwidth-factor *bandwidth-factor*

Syntax Description	<i>bandwidth-factor</i>	Integer from 1 to 4000000 that specifies the desired bandwidth factor (in bits per second). The default is 10 bits per second.
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Defaults	10 bits per second
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Command Modes	Global configuration
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Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines	The canonical qos best-effort bandwidth-factor command specifies an average bandwidth that is expected to be used by best-effort QoS class mobile sessions. The default value of 10 bps is chosen arbitrarily. If you observe that users accessing the GGSN are using a higher average bandwidth, then you should increase the bandwidth value.
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Note

Before configuring the average bandwidth expected to be used by the best-effort QoS class using the **gprs canonical-qos best-effort bandwidth-factor** command, canonical QoS must be enabled using the **gprs qos map canonical-qos** command.

Examples	The following example configures a bandwidth factor of 20: <pre>gprs canonical-qos best-effort bandwidth-factor 20</pre>
-----------------	---

Related Commands	Command	Description
	gprs canonical-qos gsn-resource-factor	Specifies the total amount of resource that the GGSN uses to provide canonical QoS service levels to mobile users.
	gprs qos map canonical-qos	Enables the mapping of GPRS QoS categories to a canonical QoS method.

gprs canonical-qos gsn-resource-factor

To specify the total amount of resource that the GGSN uses to provide canonical QoS service levels to mobile users, use the **gprs canonical-qos gsn-resource-factor** global configuration command. To return to the default value, use the **no** form of this command.

gprs canonical-qos gsn-resource-factor *resource-factor*

no gprs canonical-qos gsn-resource-factor *resource-factor*

Syntax Description	<i>resource-factor</i>	Integer between 1 and 4294967295 representing an amount of resource that the GGSN calculates internally for canonical QoS processing. The default value is 3145728000.
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Defaults	3,145,728,000
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Command Modes	Global configuration
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Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX and the default value was changed from 1,048,576 to 3,145,728,000 bits per second.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines	The default value for this command was chosen to support 10000 PDP contexts with a premium QoS class. If a greater throughput is required for GPRS user data, increase the resource factor value. However, selecting a high value may result in exceeding the actual processing capacity of the GGSN.
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Examples	The following example configures a resource factor of 1048576: <pre>gprs canonical-qos gsn-resource-factor 1048576</pre>
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Related Commands	Command	Description
	gprs canonical-qos best-effort bandwidth-factor	Specifies the bandwidth factor to be applied to the canonical best-effort QoS class.
	gprs canonical-qos premium mean-throughput-deviation	Specifies a mean throughput deviation factor that the GGSN uses to calculate the allowable data throughput for the premium QoS class.

gprs canonical-qos map tos

To specify a QoS mapping from the canonical QoS classes to an IP type of service (ToS) precedence value, use the **gprs canonical-qos map tos** global configuration command. To remove a QoS mapping and return to the default values, use the **no** form of this command.

```
gprs canonical-qos map tos [premium tos-value [normal tos-value [best-effort tos-value]]]
```

```
no gprs canonical-qos map tos [premium tos-value [normal tos-value [best-effort tos-value]]]
```

Syntax Description

premium <i>tos-value</i>	ToS mapping for a premium QoS. The <i>tos-value</i> can be a number from 0 to 5. A higher number indicates a higher service priority. The default is 2.
normal <i>tos-value</i>	ToS mapping for a normal QoS. The <i>tos-value</i> can be a number from 0 to 5. A higher number indicates a higher service priority. The default is 1.
best-effort <i>tos-value</i>	ToS mapping for a best effort QoS. The <i>tos-value</i> can be a number from 0 to 5. A higher number indicates a higher service priority. The default is 0.

Defaults

When canonical QoS is enabled on the GGSN, the default IP ToS precedence values are assigned according to the canonical QoS class as follows:

- Premium—2
- Normal—1
- Best effort—0

Command Modes

Global configuration

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **gprs canonical-qos map tos** command to specify a mapping between various QoS categories and the ToS precedence bits in the IP header for packets transmitted over the Gn (GTP tunnels) and Gi interfaces.

All the keyword arguments for the command are optional. However, if you specify a value for the **normal** argument, you must specify a value for the **premium** argument. And if you specify a value with the **best-effort** argument, then you must specify a value for both the **premium** and the **normal** arguments.

When a request for a user session comes in (a PDP context activation request), the GGSN determines whether the requested QoS for the session packets can be handled based on the maximum packet handling capability of the GGSN. Based on this determination, one of the following occurs:

- If the requested QoS can be provided, then it is maintained.
- If the requested QoS cannot be provided, then the QoS for the requested session is either lowered, or the session is rejected.

Examples

The following example specifies a QoS mapping from the canonical QoS classes to a premium ToS category of five, a normal ToS category of three, and a best-effort ToS category of two:

```
gprs canonical-qos map tos premium 5 normal 3 best-effort 2
```

Related Commands

Command	Description
gprs canonical-qos best-effort bandwidth-factor	Specifies the bandwidth factor to be applied to the canonical best-effort QoS class.
gprs canonical-qos gsn-resource-factor	Specifies the total amount of resource that the GGSN uses to provide canonical QoS service levels to mobile users.
gprs canonical-qos premium mean-throughput-deviation	Specifies a mean throughput deviation factor that the GGSN uses to calculate the allowable data throughput for the premium QoS class.
gprs qos map canonical-qos	Enables mapping of GPRS QoS categories to a canonical QoS method that includes best effort, normal, and premium QoS classes.

gprs canonical-qos premium mean-throughput-deviation

To specify a mean throughput deviation factor that the GGSN uses to calculate the allowable data throughput for the premium QoS class, use the **gprs canonical-qos premium mean-throughput-deviation** global configuration command. To return to the default value, use the **no** form of this command.

gprs canonical-qos premium mean-throughput-deviation *deviation_factor*

no gprs canonical-qos premium mean-throughput-deviation *deviation_factor*

Syntax Description	<i>deviation_factor</i>	Value that specifies the deviation factor. This value can range from 1 to 1000. The default value is 100.
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Defaults	100
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Command Modes	Global configuration
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Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines The GGSN uses the **gprs canonical-qos premium mean-throughput-deviation** command to calculate a mean throughput value that determines the amount of data throughput used for a premium QoS. The calculation is made based on the following formula, which includes the input deviation factor:

$$EB = \text{Min}[p, m + a(p - m)]$$

Where

EB = the effective bandwidth

p = peak throughput from the GPRS QoS profile in PDP context requests

m = mean throughput from the GPRS QoS profile in PDP context requests

a = the deviation factor divided by 1000 (a/1000)

Examples The following example configures a mean throughput deviation of 1000:

```
gprs canonical-qos premium mean-throughput-deviation 1000
```

Related Commands	Command	Description
	gprs canonical-qos best-effort bandwidth-factor	Specifies the bandwidth factor to be applied to the canonical best-effort QoS class.
	gprs canonical-qos gsn-resource-factor	Specifies the total amount of resource that the GGSN uses to provide canonical QoS service levels to mobile users.
	gprs canonical-qos map tos	Specifies a QoS mapping from the canonical QoS classes to an IP ToS category.

gprs charging cdr-aggregation-limit

To specify the maximum number of call detail records (CDRs) that the GGSN aggregates in a charging data transfer message to a charging gateway, use the **gprs charging cdr-aggregation-limit** global configuration command. To return to the default value, use the **no** form of this command.

gprs charging cdr-aggregation-limit *cdr-limit*

no gprs charging cdr-aggregation-limit *cdr-limit*

Syntax Description	<i>cdr-limit</i>	An integer between 1 and 255 that specifies the number of CDRs that can be accumulated in a charging data transfer message. The default is 255 CDRs.
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Defaults	255 CDRs
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Command Modes	Global configuration
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Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **gprs charging cdr-aggregation-limit** command to specify the maximum number of CDRs that can be accumulated in a charging data transfer message to a charging gateway connected to the GGSN. When the aggregation limit is reached, the GGSN puts the CDRs into a message and immediately sends it to the charging gateway.

To view the configured CDR aggregation limit, use the **show gprs charging parameters** command.

Examples

The following example specifies 128 CDRs:

```
gprs charging cdr-aggregation-limit 128
```

Related Commands	Command	Description
	gprs charging container volume-threshold	Specifies the maximum number of bytes that the GGSN maintains across all containers for a particular PDP context before closing and updating the G-CDR.
	gprs charging packet-queue-size	Specifies the maximum number of unacknowledged charging data transfer requests that the GGSN maintains in its queue.

Command	Description
gprs charging transfer interval	Specifies the number of seconds that the GGSN waits before it transfers charging data to the charging gateway.
show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging cdr-option apn-selection-mode

To enable the GGSN to provide the reason code for APN selection in G-CDRs, use the **gprs charging cdr-option apn-selection-mode** global configuration command. To disable APN selection mode, use the **no** form of this command.

gprs charging cdr-option apn-selection-mode

no gprs charging cdr-option apn-selection-mode

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Global configuration

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **gprs charging cdr-option apn-selection-mode** command to enable the GGSN to provide the reason code for APN selection in G-CDRs.

The following list shows the possible APN selection reason codes:

- 0—MS or network provided, subscription verified
- 1—MS provided, subscription not verified
- 2—Network provided, subscription not verified

To verify configuration of APN selection in G-CDRs, use the **show gprs charging parameters** command.

Examples The following example enables the GGSN to provide the APN selection mode in G-CDRs:

```
gprs charging cdr-option apn-selection-mode
```

Related Commands	Command	Description
	gprs charging cdr-option local-record-sequence-number	Enables the GGSN to use the local record sequence number field in CDRs.
	gprs charging cdr-option node-id	Enables the GGSN to specify the node that generated the CDR in the node ID field in G-CDRs.

Command	Description
gprs charging cdr-option no-partial-cdr-generation	Disables the GGSN from creating partial G-CDRs.
gprs charging cdr-option packet-count	Enables the GGSN to provide uplink and downlink packet counts in the optional record extension field of G-CDRs.
gprs charging cdr-option served-msisdn	Enables the GGSN to provide the MSISDN number from the create PDP context request in G-CDRs.
show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging cdr-option local-record-sequence-number

To enable the GGSN to use the local record sequence number field in G-CDRs, use the **gprs charging cdr-option local-record-sequence-number** global configuration command. To disable use of the local record sequence number, use the **no** form of this command.

gprs charging cdr-option local-record-sequence-number

no gprs charging cdr-option local-record-sequence-number

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Global configuration

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Certain charging data systems use the local record sequence number field in CDRs to associate the partial records generated in the SGSN and GGSN with a particular PDP context. If the charging gateway implements this feature, use the **gprs charging cdr-option local-record-sequence-number** command to enable the feature on the GGSN.

To verify configuration of the local record sequence number in G-CDRs, use the **show gprs charging parameters** command.

Examples The following example enables the GGSN to provide the local record sequence number field in G-CDRs:

```
gprs charging cdr-option local-record-sequence-number
```

Related Commands	Command	Description
	gprs charging cdr-option apn-selection-mode	Enables the GGSN to provide the reason code for APN selection in G-CDRs.
	gprs charging cdr-option node-id	Enables the GGSN to specify the node that generated the CDR in the node ID field in G-CDRs.

Command	Description
gprs charging cdr-option no-partial-cdr-generation	Disables the GGSN from creating partial G-CDRs.
gprs charging cdr-option packet-count	Enables the GGSN to provide uplink and downlink packet counts in the optional record extension field of G-CDRs.
gprs charging cdr-option served-msisdn	Enables the GGSN to provide the MSISDN number from the create PDP context request in G-CDRs.
show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging cdr-option node-id

To enable the GGSN to specify the node that generated the CDR in the node ID field in G-CDRs, use the **gprs charging cdr-option node-id** global configuration command. To disable specifying the node ID, use the **no** form of this command.

gprs charging cdr-option node-id

no gprs charging cdr-option node-id

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Global configuration

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Certain charging data systems use the node ID field in CDRs to identify the node that generated the CDR. If the charging gateway that your GGSN communicates with uses this feature, use the **gprs charging cdr-option node-id** command to enable the feature.

To verify configuration of the node ID field in G-CDRs, use the **show gprs charging parameters** command.

Examples The following example enables the GGSN to use the node ID field in G-CDRs:

```
gprs charging cdr-option node-id
```

Related Commands	Command	Description
	gprs charging cdr-option apn-selection-mode	Enables the GGSN to provide the reason code for APN selection in G-CDRs.
	gprs charging cdr-option local-record-sequence-number	Enables the GGSN to use the local record sequence number field in G-CDRs.
	gprs charging cdr-option no-partial-cdr-generation	Disables the GGSN from creating partial G-CDRs.

Command	Description
gprs charging cdr-option packet-count	Enables the GGSN to provide uplink and downlink packet counts in the optional record extension field of G-CDRs.
gprs charging cdr-option served-msisdn	Enables the GGSN to provide the MSISDN number from the create PDP context request in G-CDRs.
show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging cdr-option no-partial-cdr-generation

To disable the GGSN from creating partial CDRs, use the **gprs charging cdr-option no-partial-cdr-generation** global configuration command. To enable partial CDR creation, use the **no** form of this command.

gprs charging cdr-option no-partial-cdr-generation

no gprs charging cdr-option no-partial-cdr-generation

Syntax Description This command has no arguments or keywords.

Defaults Non-primary partial CDR generation is enabled.

Command Modes Global configuration

Command History	Release	Modification
	12.1(5)T	This command was introduced.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **gprs charging cdr-option no-partial-cdr-generation** command when you want all of the fields in the primary G-CDR to be included in any subsequent G-CDRs (partial G-CDRs) for the same PDP context request. By default, partial G-CDRs do not contain the following fields: network initiated PDP context, access point name (network identifier), PDP type, served PDP address, and dynamic address flag.

The CDR fields identify its uniqueness and association with a particular PDP context. When you enable the **gprs charging cdr-option no-partial-cdr-generation** command, the GGSN creates any subsequent G-CDRs for the same PDP context request with the same fields in all G-CDRs and maintains sequence numbering.

If the **gprs charging cdr-option no-partial-cdr-generation** command is configured, and a G-CDR is closed due to any triggers (such as tariff times, or QoS changes), then the GGSN copies the last SGSN (the current SGSN) in the list in the new G-CDR. If the **gprs charging cdr-option no-partial-cdr-generation** command is not configured, the current SGSN is not included in the subsequent partial G-CDR.

If the **gprs charging container sgsn-change-limit** command is configured when the **gprs charging cdr-option no-partial-cdr-generation** command is configured, the list is not sent. This is a reason that the **gprs charging cdr-option no-partial-cdr-generation** command is not compatible with the **gprs charging container sgsn-change-limit** command.

**Note**

Enable this command only when there are no active PDP contexts. Enabling this feature will affect all subsequent PDP contexts.

To verify whether non-primary partial CDR creation is enabled or disabled on the GGSN, use the **show gprs charging parameters** command.

Examples

The following example disables non-primary partial CDRs on the GGSN:

```
gprs charging cdr-option no-partial-cdr-generation
```

Related Commands

Command	Description
gprs charging cdr-option apn-selection-mode	Enables the GGSN to provide the reason code for APN selection in G-CDRs.
gprs charging cdr-option local-record-sequence-number	Enables the GGSN to use the local record sequence number field in G-CDRs.
gprs charging cdr-option node-id	Enables the GGSN to specify the node that generated the CDR in the node ID field in G-CDRs.
gprs charging cdr-option packet-count	Enables the GGSN to provide uplink and downlink packet counts in the optional record extension field of G-CDRs.
gprs charging cdr-option served-msisdn	Enables the GGSN to provide the MSISDN number from the create PDP context request in G-CDRs.
show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging cdr-option packet-count

To enable the GGSN to provide uplink and downlink packet counts in the optional record extension field of a G-CDR, use the **gprs charging cdr-option packet-count** global configuration command. To disable providing packet counts, use the **no** form of this command.

gprs charging cdr-option packet-count

no gprs charging cdr-option packet-count

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Global configuration

Command History	Release	Modification
	12.1(5)T	This command was introduced.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines When you issue the **gprs charging cdr-option packet-count** command, then the GGSN provides a packet count in the optional record extension field for all uplink and downlink packets transferred since the CDR was opened and subsequently closed.

The following object IDs (OIDs) are used in the optional record extension field of the CDR for the uplink and downlink packet counts:

- OID of the uplink packet count—1.3.6.1.4.1.9.10.48.1.2.2.98
- OID of the downlink packet count—1.3.6.1.4.1.9.10.48.1.2.2.99

To verify whether the packet count CDR option is enabled or disabled on the GGSN, use the **show gprs charging parameters** command.

Examples The following example enables uplink and downlink packet counts in CDRs on the GGSN:

```
gprs charging cdr-option packet-count
```

Related Commands	Command	Description
	gprs charging cdr-option apn-selection-mode	Enables the GGSN to provide the reason code for APN selection in G-CDRs.
	gprs charging cdr-option local-record-sequence-number	Enables the GGSN to use the local record sequence number field in G-CDRs.
	gprs charging cdr-option node-id	Enables the GGSN to specify the node that generated the CDR in the node ID field in G-CDRs.
	gprs charging cdr-option no-partial-cdr-generation	Disables the GGSN from creating partial G-CDRs.
	gprs charging cdr-option served-msisdn	Enables the GGSN to provide the MSISDN number from the create PDP context request in G-CDRs.
	show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging cdr-option served-msisdn

To enable the GGSN to provide the mobile station integrated services digital network (MSISDN) number from the create PDP context request in a G-CDR, use the **gprs charging cdr-option served-msisdn** global configuration command. To disable providing the MSISDN number, use the **no** form of this command.

gprs charging cdr-option served-msisdn

no gprs charging cdr-option served-msisdn

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Global configuration

Command History	Release	Modification
	12.2(2)	This command was introduced.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **gprs charging cdr-option served-msisdn** command to enable the GGSN to provide the mobile station ISDN number from the create PDP context request in a G-CDR.

To verify whether the served MSISDN option is enabled or disabled on the GGSN, use the **show gprs charging parameters** command.

Examples The following example enables the GGSN to provide the MSISDN number from the create PDP context request in G-CDRs:

```
gprs charging cdr-option served-msisdn
```

Related Commands	Command	Description
	gprs charging cdr-option apn-selection-mode	Enables the GGSN to provide the reason code for APN selection in G-CDRs.
	gprs charging cdr-option local-record-sequence-number	Enables the GGSN to use the local record sequence number field in G-CDRs.
	gprs charging cdr-option node-id	Enables the GGSN to specify the node that generated the CDR in the node ID field in G-CDRs.

Command	Description
gprs charging cdr-option no-partial-cdr-generation	Disables the GGSN from creating partial G-CDRs.
gprs charging cdr-option packet-count	Enables the GGSN to provide uplink and downlink packet counts in the optional record extension field of G-CDRs.
show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging cg-path-requests

To specify the number of minutes that the GGSN waits before trying to establish the TCP path to the charging gateway when TCP is the specified path protocol, use the **gprs charging cg-path-requests** global configuration command. To return to the default value, use the **no** form of this command.

gprs charging cg-path-requests *minutes*

no gprs charging cg-path-requests

Syntax Description	<i>minutes</i>	Number of minutes the GGSN waits before retrying a charging request. The default value is 0 minutes, which disables the timer.
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Defaults	0 minutes
-----------------	-----------

Command Modes	Global configuration
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Command History	Release	Modification
	12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.	
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.	
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.	
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.	

Usage Guidelines	Use the gprs charging cg-path-requests command to specify the number of minutes that the GGSN waits before trying to establish the TCP path to the charging gateway when TCP is the specified path protocol.
-------------------------	---

Examples	The following example specifies that the GGSN waits 5 minutes before trying to establish the TCP path to the charging gateway: <pre>gprs charging cg-path-requests 5</pre>
-----------------	---

Related Commands	Command	Description
	show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging container change-limit

To specify the maximum number of charging containers within each CDR from the GGSN, use the **gprs charging container change-limit** global configuration command. To return to the default value, use the **no** form of this command.

gprs charging container change-limit *number*

no gprs charging container change-limit *number*

Syntax Description

number Integer from 1 to 100. The default value is 5.

Defaults

5 containers

Command Modes

Global configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

For each activated PDP context on the GGSN, the GGSN creates a G-CDR to collect charging information to be sent to the charging gateway. When certain conditions occur for a PDP context, the GGSN adds information to the CDR or closes the CDR, depending on the trigger condition.

When a CDR is open for a PDP context and the GGSN detects a trigger condition, the GGSN collects the current charging data for that PDP context and appends it to the existing G-CDR in what is called a CDR container.

The following conditions cause the GGSN to create a CDR container and send updates to the charging gateway:

- Quality of service (QoS) change
- Tariff time change
- Periodic collection interval
- Destination change
- CDR closure

The following conditions cause the GGSN to create a CDR container and close the G-CDR:

- End of PDP context
- Partial record reason

To control the maximum number of these trigger conditions, and therefore CDR containers in each G-CDR, use the **gprs charging container change-limit** command.

When the number of containers added to a G-CDR reaches the limit specified in the **gprs charging container change-limit** command, the G-CDR is closed and sent as a partial CDR to the charging gateway. If the PDP context remains active, the GGSN opens another G-CDR with a subsequent sequence number associated with that PDP context and its charging data.

Examples

The following example specifies that each CDR includes 25 charging containers:

```
gprs charging change-condition-limit 25
```

Related Commands

Command	Description
gprs charging container volume-threshold	Specifies the maximum number of bytes that the GGSN maintains across all containers for a particular PDP context before closing and updating the G-CDR.
show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging container sgsn-change-limit

To specify the maximum number of SGSN changes before closing a G-CDR for a particular PDP context, use the **gprs charging container sgsn-change-limit** global configuration command. To return to the default value, use the **no** form of this command.

gprs charging container sgsn-change-limit *number*

no gprs charging container sgsn-change-limit *number*

Syntax Description	<i>number</i>	Integer from 0 to 15. The default value is disabled.
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Defaults	Disabled
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Command Modes	Global configuration
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Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD, with the following changes: <ul style="list-style-type: none"> • The no form of the command was added. • The default value changed from 15 to disabled.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

A value of 0 means that a G-CDR is closed each time that a new SGSN begins handling the PDP context. The command specifies the number of changes, not the number of SGSNs to be supported. The number of SGSNs supported is equal to 1 more than the change limit. For example, if the SGSN change limit is 2, the maximum number of SGSNs in the list before the GGSN closes the G-CDR is 3.

The CDR fields identify its uniqueness and association with a particular PDP context. When you enable the **gprs charging cdr-option no-partial-cdr-generation** command, the GGSN creates any subsequent G-CDRs for the same PDP context request with the same fields in all G-CDRs and maintains sequence numbering.

If the **gprs charging container sgsn-change-limit** command is not configured when **gprs charging cdr-option no-partial-cdr-generation** command is configured, and a G-CDR is closed due to any other trigger (such as tariff times or QoS changes), the GGSN copies the last SGSN (the current SGSN) in the list in the new G-CDR.

If the **gprs charging container sgsn-change-limit** command is configured when the **gprs charging cdr-option no-partial-cdr-generation** command is configured, the list is not sent. This is a reason that the **gprs charging container sgsn-change-limit** command is not compatible with the **gprs charging cdr-option no-partial-cdr-generation** command.

Examples

The following example specifies that a G-CDR closes after 5 SGSN changes in a list for a particular PDP context. If the PDP context is still active, then a partial CDR is opened:

```
gprs charging container sgsn-change-limit 5
```

gprs charging container volume-threshold

To specify the maximum number of bytes that the GGSN maintains across all containers for a particular PDP context before closing and updating the G-CDR, use the **gprs charging container volume-threshold** global configuration command. To return to the default value, use the **no** form of this command.

gprs charging container volume-threshold *threshold-value*

no gprs charging container volume-threshold *threshold-value*

Syntax Description	<i>threshold-value</i>	A value between 1 and 4294967295 that specifies the container threshold value, in bytes. The default is 1,048,576 bytes (1 MB).
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Defaults	1,048,576 bytes (1 MB)
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Command Modes	Global configuration
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Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines While a PDP context (mobile session) is active, charging events are generated based on various actions. One way that users can be charged is based on the amount of data transmitted between the PDN and the mobile station. Data volume is recorded in each of the containers of a G-CDR record. Service providers can use this recorded data volume to bill users by volume usage.

Use the **gprs charging container volume-threshold** command to control the maximum amount of data volume that can be reported in each G-CDR from an active PDP context before the G-CDR is eligible for an update to the charging gateway for subsequent billing. The GGSN opens another partial G-CDR for that PDP context while it remains in session on the GGSN.

For example, consider that a volume threshold setting of 1 MB is configured on the GGSN. The GGSN opens a container in a G-CDR for a new PDP context. A trigger occurs for the PDP context, and at that time the GGSN has registered transmission of 500 KB of data for the PDP context. The trigger causes the GGSN to close the container for the PDP context, which has occurred before the volume limit is reached (500 KB of data transmitted, and 1 MB allowed).

As transmission for the PDP context continues, the GGSN opens a new container in the G-CDR. The GGSN now has up to 500 KB more data that can be processed for that PDP context before reaching the volume threshold limit for the G-CDR. When the volume threshold is reached across all containers for the PDP context (that is, the sum of all of the byte counts across all containers for the PDP context

reaches 1 MB), the GGSN closes the G-CDR with a volume limit cause so that the G-CDR can be sent to the charging gateway. The GGSN opens another partial G-CDR for the PDP context while it remains in session.

Examples

The following example specifies a threshold value of 2097152:

```
gprs charging container volume-threshold 2097152
```

Related Commands

Command	Description
gprs charging container change-limit	Specifies the maximum number of charging containers within each CDR from the GGSN
show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging disable

To disable charging transactions on the GGSN, use the **gprs charging disable** global configuration command. To re-enable charging transactions, use the **no** form of this command.

gprs charging disable

no gprs charging disable

Syntax Description This command has no arguments or keywords.

Defaults Charging is enabled.

Command Modes Global configuration

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **gprs charging disable** command to disable charging. By default, charging processing is enabled on the GGSN.

Before the GGSN can disable charging, any currently open CDRs must be cleared. To clear any open CDRs, use the **clear gprs charging cdr** command.

If you disable charging on the GGSN using the **gprs charging disable** command, then you can re-enable charging using the **no gprs charging disable** command.



Caution

The **gprs charging disable** command removes charging data processing on the GGSN, which means that the data required to bill customers for network usage is not being collected by the GGSN nor sent to the charging gateway. Cisco Systems recommends that you avoid using this command in production GPRS network environments. If you must configure this command, use it with extreme care and reserve its usage only for non-production network conditions.

Examples

The following example disables GPRS charging processing:

```
gprs charging disable
```

gprs charging flow-control private-echo

To implement an echo request with private extensions for maintaining flow control on packets transmitted to the charging gateway, use the **gprs charging flow-control private-echo** global configuration command. To disable private extensions for flow control, use the **no** form of this command.

gprs charging flow-control private-echo

no gprs charging flow-control private-echo

Syntax Description This command has no arguments or keywords.

Defaults Private flow control is disabled.

Command Modes Global configuration

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines If the charging gateway that the GGSN communicates with implements a proprietary private extension to the echo signal that maintains flow control, use the **gprs charging flow-control private-echo** command to enable private echo signaling. If your charging gateway does not implement this feature, disable the feature.

Examples The following example enables an echo request:

```
gprs charging flow-control private-echo
```

Related Commands	Command	Description
	show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging header short

To enable the GGSN to use the GTP short header (6-byte header), use the **gprs charging header short** global configuration command. To return to the default value, use the **no** form of this command.

gprs charging header short

no gprs charging header short

Syntax Description This command has no arguments or keywords.

Defaults Disabled. The GGSN uses the GTP long header.

Command Modes Global configuration

Command History

Release	Modification
12.2(8)YW	This command was introduced.

Usage Guidelines

Use the **gprs charging header short** command to specify for the GGSN to use the GTP short header (6-byte header).

Examples

The following example shows the use of the GTP short header being enabled:

```
gprs charging header short
```

Related Commands

Command	Description
show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging map data tos

To specify an IP ToS mapping for GPRS charging packets, use the **gprs charging map data tos** global configuration command. To return to the default value, use the **no** form of this command.

gprs charging map data tos *tos-value*

no gprs charging map data tos *tos-value*

Syntax Description	<i>tos-value</i>	Specifies a ToS mapping value between 0 and 5. A higher number indicates a higher service priority. The default value is 3.
---------------------------	------------------	---

Defaults	3
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Command Modes	Global configuration
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Command History	Release	Modification
	12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.	
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.	
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.	
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.	

Usage Guidelines	Use the gprs charging map data tos command to specify a value for the ToS precedence bits in the IP header for charging packets transmitted by the GGSN.
-------------------------	---

Examples	The following example shows type of service mapping value of 5: <pre>gprs charging map data tos 5</pre>
-----------------	--

Related Commands	Command	Description
	show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging message transfer-request command-ie

To specify for the GGSN to include the Packet Transfer Command IE in the Data Record Transfer Response messages, use the **gprs charging message transfer-request command-ie** command. To return to the default value, use the no form of this command.

gprs charging message transfer-request command-ie

no gprs charging message transfer-request command-ie

Syntax Description This command has no arguments or keywords.

Defaults The GGSN does not include the Packet Transfer Command IE.

Command Modes Global configuration

Command History	Release	Modification
	12.2(8)YW	This command was introduced.

Usage Guidelines GGSN Release 4.0 supports the Send Data Record Packet command.

Examples The following example specifies for the GGSN to include the Packet Transfer Command IE in Data Record Transfer Response messages:

```
gprs charging message transfer-request command-ie
```

Related Commands	Command	Description
	show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging message transfer-response number-responded

To specify for the GGSN to use the Number of Requests Responded field instead of the Length field in the Requests Responded Information Element (IE) of Data Record Transfer Response messages, use the **gprs charging message transfer-response number-responded** command. To return to the default value, use the **no** form of this command.

gprs charging message transfer-response number-responded

no gprs charging message transfer-response number-responded

Syntax Description This command has no arguments or keywords.

Defaults The GGSN uses the Length field.

Command Modes Global configuration

Command History	Release	Modification
	12.2(8)YW	This command was introduced.

Usage Guidelines Use the **gprs charging message transfer-response number-responded** command to specify for the GGSN to use the Number of Requests Responded field instead of the Length field in the Requests Responded IE of Data Record Transfer Response messages when connecting to a charging gateway that does not support the Length field.

Examples The following example specifies for the GGSN to use the Number of Requests Responded field:

```
gprs charging message transfer-response number-responded
```

Related Commands	Command	Description
	show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging packet-queue-size

To specify the maximum number of unacknowledged charging data transfer requests that the GGSN maintains in its queue, use the **gprs charging packet-queue-size** global configuration command. To return to the default value, use the **no** form of this command.

gprs charging packet-queue-size *queue-size*

no gprs charging packet-queue-size *queue-size*

Syntax Description

<i>queue-size</i>	Value between 1 and 512 that specifies the maximum queue size for the GGSN charging packet data queue. The default is 128 packets.
-------------------	--

Defaults

128 packets

Command Modes

Global configuration

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **gprs charging packet-queue-size** command to specify the maximum size of the GGSN queue of outstanding charging data transfer requests. This queue stores all unacknowledged charging data requests.

When the charging packet queue reaches the specified size, the GGSN stops queuing charging packets until a packet is cleared from the queue and stores new charging packets in memory.

If monitoring of the performance of the charging gateway indicates that it is processing charging packets slowly, you can increase the size of the charging packet queue. Conversely, if the performance of the charging gateway is fast, you can decrease the size of the charging packet queue.

Examples

The following example specifies a GGSN queue of 512 charging data transfer requests:

```
gprs charging packet-queue-size 512
```

Related Commands

Command	Description
show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging path-protocol

To specify the protocol that the GGSN uses to transmit and receive charging data, use the **gprs charging path-protocol** global configuration command. To return to the default value, use the **no** form of this command.

```
gprs charging path-protocol {udp | tcp}
```

```
no gprs charging path-protocol {udp | tcp}
```

Syntax Description	Command	Description
	udp	User Datagram Protocol, which is a connectionless transport protocol.
	tcp	Transport Control Protocol, which is a connection-based transport protocol.

Defaults	Default Value
	UDP

Command Modes	Configuration Mode
	Global configuration

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines	Guidelines
	Use the gprs charging path-protocol command to specify the protocol used by the GGSN to transfer charging data.

Examples	Example
	The following example shows a UDP protocol:

```
gprs charging path-protocol udp
```

Related Commands	Command	Description
	gprs charging cg-path-requests	Specifies the number of minutes that the GGSN waits before trying to establish the TCP path to the charging gateway when TCP is the specified path protocol.
	show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging port

To configure the destination port of the charging gateway, use the **gprs charging port** global configuration command. To return to the default value, use the **no** form of this command.

gprs charging port *port-num*

no gprs charging port *port-num*

Syntax Description	<i>port-num</i>	Integer from 1024 to 10000. The default port is 3386.
---------------------------	-----------------	---

Defaults	Port 3386
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Command Modes	Global configuration
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Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Examples The following example changes the default port of 3386 to 1055:

```
gprs charging port 1055
```

Related Commands	Command	Description
	show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging release

To specify that the GGSN present R98/R97 and R99 QoS profile formats in G-CDRs or present only R97/R98 QoS profile formats, use the **gprs charging release** global configuration command. To disable specifying the configuration, use the **no** form of this command.

gprs charging release {99 | 98}

no gprs charging release {99 | 98}

Syntax Description	99	98
	Specifies for the GGSN to present R97/R98 and R99 QoS profile formats in G-CDRs.	Specifies for the GGSN to present only R97/R98 QoS profile formats in G-CDRs.

Defaults 99

Command Modes Global configuration

Command History	Release	Modification
	12.2(8)YW	This command was introduced.

Usage Guidelines To verify configuration of the QoS profile format in G-CDRs, use the **show gprs charging parameters** command.

Examples The following example enables the GGSN to present both R97/R98 QoS profile formats and R99 QoS profile formats in G-CDRs:

```
gprs charging release 99
```

Related Commands	Command	Description
	gprs charging cdr-option apn-selection-mode	Enables the GGSN to provide the reason code for APN selection in G-CDRs.
	gprs charging cdr-option local-record-sequence-number	Enables the GGSN to use the local record sequence number field in G-CDRs.
	gprs charging cdr-option no-partial-cdr-generation	Disables the GGSN from creating partial G-CDRs.
	gprs charging cdr-option packet-count	Enables the GGSN to provide uplink and downlink packet counts in the optional record extension field of G-CDRs.

Command	Description
gprs charging cdr-option served-msisdn	Enables the GGSN to provide the MSISDN number from the create PDP context request in G-CDRs.
show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging roamers

To enable charging for roamers on the GGSN, use the **gprs charging roamers** global configuration command. To disable charging for roamers on the GGSN, use the **no** form of this command.

gprs charging roamers

no gprs charging roamers

Syntax Description This command has no arguments or keywords.

Defaults Charging for roamers is disabled.

Command Modes Global configuration

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.

Usage Guidelines Use the **gprs charging roamers** command to enable support on the GGSN for the creation of call detail records (CDRs) for roaming mobile subscribers.

When charging for roamers is enabled on the GGSN, and a create PDP context message is received, the IE containing the SGSN Signalling Address field is matched against the list of PLMN IP address ranges defined using the **gprs plmn ip address** command. If the GGSN determines that an SGSN is not located within the same PLMN range, it generates a CDR. If the GGSN determines that an SGSN is located within the same PLMN, will not generate a CDR until the SGSN Address for Signalling field changes to that of a SGSN located in another PLMN.

When charging for roamers is enabled on the GGSN using the **gprs charging roamers** command, how the feature functions is dependent on how the PLMN IP address ranges have been defined using the **gprs plmn ip address** command.

Depending on how PLMN IP address ranges have been defined using the **gprs plmn ip address start_ip end_ip [sgsn]** command, the charging for roamers feature operates as follows:

- If no PLMN IP address ranges have been configured using the **gprs plmn ip address start_ip end_ip [sgsn]** command, the GGSN will generate CDRs for all initiated PDP contexts regardless of whether the GGSN and SGSN are located within the same PLMN.
- If a list of PLMN IP address ranges has been configured using the **gprs plmn ip address start_ip end_ip [sgsn]** command, but the **sgsn** keyword has not been specified for any of the ranges, the GGSN will use all the range entries when determining whether the SGSN is located within the same PLMN.

- If a list of PLMN IP address ranges has been configured using the **gprs plmn ip address** *start_ip end_ip* [**sgsn**] command, and one or more of those ranges has been defined using the **sgsn** key word, the GGSN will use those ranges with the **sgsn** keyword specified to determine whether an SGSN is located within the same PLMN.

With this configuration, the following scenarios outline how the charging for roamers feature will function:

- MS1 is subscribed to PLMN1 and attaches to an SGSN in PLMN2. From PLMN2, MS1 initiates a PDP context with the GGSN in PLMN1. In this case, MS1 is a roamer and the GGSN generates a CDR because it determines that the SGSN is located in a different PLMN.
- MS1 is subscribed to PLMN1 and attaches to an SGSN in PLMN2. From PLMN2, MS1 initiates a PDP context with the GGSN in PLMN2. In this case, MS1 is not a roamer because the SGSN and GGSN are in the same PLMN. The GGSN does not create a G-CDR.

Configuration Guidelines

To enable charging for roamers on the GGSN, you should first define a set of IP address ranges for a PLMN using the **gprs plmn ip address** command.

It is important that you configure the **gprs plmn ip address** and **gprs charging roamers** commands in their proper order. After you configure the IP address range for a PLMN, use the **gprs charging roamers** command to enable charging for roamers on the GGSN. You can change the IP address range by reissuing the **gprs plmn ip address** command.

To verify your configuration, use the **show gprs charging parameters** command to see if the charging for roamers command is enabled. To verify your PLMN IP address ranges, use the **show gprs plmn ip address** command.

Examples

The following example enables the charging for roamers feature on the GGSN:

```
gprs charging roamers
```

Related Commands

Command	Description
gprs plmn ip address	Defines the IP address range for a PLMN that the GGSN uses to determine whether a create PDP context request is from a roamer.
show gprs charging parameters	Displays information about the current GPRS charging configuration.
show gprs plmn ip address	Displays a list of defined PLMN IP address ranges.

gprs charging send-buffer

To configure the size of the buffer that contains the GTP' PDU and signaling messages on the GGSN, use the **gprs charging send-buffer** global configuration command. To return to the default value, use the **no** form of this command.

gprs charging send-buffer *bytes*

no gprs charging send-buffer *bytes*

Syntax Description	<i>bytes</i>	Integer from 300 to 1460. The default value is 1460 bytes.
Defaults	1460 bytes	
Command Modes	Global configuration	
Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
Examples	The following example specifies a buffer size of 512 bytes: <pre>gprs charging send-buffer 512</pre>	
Related Commands	Command	Description
	show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging server-switch-timer

To specify a timeout value that determines when the GGSN attempts to find an alternate charging gateway after a destination charging gateway cannot be located or becomes unusable, use the **gprs charging server-switch-timer** global configuration command. To return to the default value, use the **no** form of this command.

gprs charging server-switch-timer *seconds*

no gprs charging server-switch-timer *seconds*

Syntax Description

<i>seconds</i>	Timeout value (between 0 and 300 seconds), that the GGSN waits before attempting to contact an alternate charging gateway. The default value is 60 seconds.
----------------	---

Defaults

60 seconds

Command Modes

Global configuration

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.

Usage Guidelines

Use the **gprs charging server-switch-timer** command to specify a timeout value that determines when the GGSN contacts an alternate charging gateway when the current charging gateway becomes unusable or cannot be located.

To specify that the switch-over to an alternate charging gateway takes place immediately, specify a value of 0.

Examples

The following example configures a time-out value of 30 seconds:

```
gprs charging server-switch-timer 30
```

Related Commands

Command	Description
show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging tariff-time

To specify a time of day when GPRS charging tariffs change, use the **gprs charging tariff-time** global configuration command. To remove an existing tariff time, use the **no** form of this command.

gprs charging tariff-time *time*

no gprs charging tariff-time *time*

Syntax Description	<i>time</i>	A time of day when the charging tariff changes. Specify the time format as hh:mm:ss.
---------------------------	-------------	--

Defaults	No default behavior or values.
-----------------	--------------------------------

Command Modes	Global configuration
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Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.

Usage Guidelines	Use the gprs charging tariff-time command to specify when the charging tariff for using GPRS will change. When the tariff time changes, a container is attached to the CDR for the user. You can set up a maximum of 32 tariff change times.
-------------------------	--

Examples	The following example specifies 14:30:00 as the time when the charging tariff changes: <pre>gprs charging tariff-time 14:30:00</pre>
-----------------	---

Related Commands	Command	Description
	show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs charging transfer interval

To specify the number of seconds that the GGSN waits before it transfers charging data to the charging gateway, use the **gprs charging transfer interval** global configuration command. To return to the default value, use the **no** form of this command.

gprs charging transfer interval *seconds*

no gprs charging transfer interval *seconds*

Syntax Description	<i>seconds</i>	Interval between charging transfers, in seconds. Can be a value between 1 and 4294967295 seconds. The default is 105 seconds.
---------------------------	----------------	---

Defaults	105 seconds
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Command Modes	Global configuration
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Command History	Release	Modification
	12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.	
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.	
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.	
12.2(8)B	This command was incorporated in Cisco IOS Release 12.2(8)B.	

Usage Guidelines	Use the gprs charging transfer interval command to specify how often the GGSN transfers charging data for a given PDP context (mobile session) to a charging gateway.
-------------------------	--

Examples	The following example specifies an interval of 512 seconds:
-----------------	---

```
gprs charging transfer interval 512
```

Related Commands	Command	Description
	show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs default aaa-group

To specify a default AAA server group and assign the type of AAA services to be supported by the server group for all access points on the GGSN, use the **gprs default aaa-group** global configuration command. To remove the default AAA server group, use the **no** form of this command.

```
gprs default aaa-group { authentication | accounting } server-group
```

```
no gprs default aaa-group { authentication | accounting } server-group
```

Syntax Description

authentication	Assigns the selected server group for authentication services on all APNs.
accounting	Assigns the selected server group for accounting services on all APNs.
<i>server-group</i>	Specifies the name of a AAA server group to be used for AAA services on all APNs.
Note	The name of the AAA server group that you specify must correspond to a server group that you configure using the aaa group server command.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

The Cisco Systems GGSN supports authentication and accounting at APNs using AAA server groups. By using AAA server groups, you gain the following benefits:

- You can selectively implement groups of servers for authentication and accounting at different APNs.
- You can configure different server groups for authentication services and accounting services in the same APN.
- You can control which RADIUS services you want to enable at a particular APN, such as AAA accounting.

The GGSN supports the implementation of AAA server groups at both the global and access-point configuration levels. You can minimize your configuration by specifying the configuration that you want to support across most APNs, at the global configuration level. Then, at the access-point configuration level, you can selectively modify the services and server groups that you want to support at a particular APN. Therefore, you can override the AAA server global configuration at the APN configuration level.

To configure a default AAA server group to be used for all APNs on the GGSN, use the **gprs default aaa-group** global configuration command. To specify a different AAA server group to be used at a particular APN for authentication or accounting, use the **aaa-group** access-point configuration command.

If accounting is enabled on the APN, then the GGSN looks for an accounting server group at the APN or globally in the following order:

- First, at the APN for an accounting server group—configured in the **aaa-group accounting** command.
- Second, for a global GPRS default accounting server group—configured in the **gprs default aaa-group accounting** command.
- Third, at the APN for an authentication server group—configured in the **aaa-group authentication** command.
- Last, for a global GPRS default authentication server group—configured in the **gprs default aaa-group authentication** command.

If authentication is enabled on the APN, then the GGSN first looks for an authentication server group at the APN. If an authentication server group is not found at the APN, then the GGSN looks for a globally configured, GPRS default authentication server group.

To complete the configuration, you also must specify the following configuration elements on the GGSN:

- Configure the RADIUS servers using the **radius-server host** command.
- Define a server group with the IP addresses of the AAA servers in that group using the **aaa group server** global configuration command.
- Enable the type of AAA services (accounting and authentication) to be supported on the APN.
 - The GGSN enables accounting by default for non-transparent APNs.

You can disable accounting services at the APN using the **aaa-accounting disable** command.
 - You can enable authentication at the APN level by configuring the **access-mode non-transparent** command. When you enable authentication, the GGSN automatically enables accounting on the APN. There is not a global configuration command to enable or disable authentication.
- Configure AAA accounting and authentication using the **aaa accounting** and **aaa authentication** global configuration commands.


Note

For more information about AAA and RADIUS global configuration commands, see the *Cisco IOS Security Command Reference*.

Examples

The following configuration example defines four AAA server groups on the GGSN: foo, foo1, foo2, and foo3, shown by the **aaa group server** commands.

Using the **gprs default aaa-group** command, two of these server groups are globally defined as default server groups: foo2 for authentication, and foo3 for accounting.

At access-point 1, which is enabled for authentication, the default global authentication server group of foo2 is overridden and the server group named foo is designated to provide authentication services on the APN. Notice that accounting services are not explicitly configured at that access point, but are automatically enabled because authentication is enabled. Because there is a globally defined accounting server-group defined, the server named foo3 will be used for accounting services.

At access-point 4, which is enabled for accounting using the **aaa-accounting enable** command, the default accounting server group of foo3 is overridden and the server group named foo1 is designated to provide accounting services on the APN.

Access-point 5 does not support any AAA services because it is configured for transparent access mode.

```

aaa new-model
!
aaa group server radius foo
  server 10.2.3.4
  server 10.6.7.8
aaa group server radius foo1
  server 10.10.0.1
aaa group server radius foo2
  server 10.2.3.4
  server 10.10.0.1
aaa group server foo3
  server 10.6.7.8
  server 10.10.0.1
!
aaa authentication ppp foo group foo
aaa authentication ppp foo2 group foo2
aaa authorization network default group radius
aaa accounting exec default start-stop group foo
aaa accounting network foo1 start-stop group foo1
aaa accounting network foo2 start-stop group foo2
aaa accounting network foo3 start-stop group foo3
!
gprs access-point-list gprs
  access-point 1
    access-mode non-transparent
    access-point-name www.pdn1.com
    aaa-group authentication foo
  !
  access-point 4
    access-mode transparent
    access-point-name www.pdn2.com
    aaa-accounting enable
    aaa-group accounting foo1
  !
  access-point 5
    access-mode transparent
    access-point-name www.pdn3.com
  !
gprs default aaa-group authentication foo2
gprs default aaa-group accounting foo3
!
radius-server host 10.2.3.4 auth-port 1645 acct-port 1646 non-standard
radius-server host 10.6.7.8 auth-port 1645 acct-port 1646 non-standard
radius-server host 10.10.0.1 auth-port 1645 acct-port 1646 non-standard
radius-server key ggsntel

```

Related Commands

Command	Description
aaa accounting	Enables AAA accounting of requested services for billing or security purposes.
aaa authorization	Sets parameters that restrict user access to a network.
aaa group server	Groups different server hosts into distinct lists and distinct methods.
aaa-accounting	Enables or disables accounting for a particular access point on the GGSN.

Command	Description
aaa-group	Specifies a RADIUS server group and assigns the type of AAA services to be supported by the server group for a particular access point on the GGSN.
radius-server host	Specifies a RADIUS server host.

gprs default aggregate

To configure the GGSN to create an aggregate route in its IP routing table when receiving PDP requests from MSs on the specified network for any access point on the GGSN, use the **gprs default aggregate** global configuration command. To remove a global aggregate route, use the **no** form of this command.

```
gprs default aggregate ip-network-prefix {/mask-bit-length | ip-mask}
```

```
no gprs default aggregate ip-network-prefix {/mask-bit-length | ip-mask}
```

Syntax Description

<i>ip-network-prefix</i>	Dotted decimal notation of the IP network address to be used by the GGSN for route aggregation, in the format <i>a.b.c.d</i> .
<i>/mask-bit-length</i>	Number of bits (as an integer) that represent the network portion of the specified IP network address. A forward slash is required before the integer. Note There is no space between the <i>ip-network-prefix</i> and the slash (/).
<i>ip-mask</i>	Dotted decimal notation of the IP network mask (in the format <i>e.f.g.h.</i>), which represents the network and host portion of the specified IP network address.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

The GGSN uses a static host route to forward user data packets received from the Gi interface to the Gn interface using the virtual template interface of the GTP tunnel.

Without the **gprs default aggregate** command or **aggregate** command, the GGSN creates a static host route for each PDP request. For example, for 45,000 PDP contexts supported, the GGSN creates 45,000 static host routes in its IP routing table.

You can use the **gprs default aggregate** command to reduce the number of static routes implemented by the GGSN for PDP requests at all access points on the GGSN. The **gprs default aggregate** command allows you to specify an IP network prefix to combine the routes of PDP requests from the same network as a single route on the GGSN.

If you use the **gprs default aggregate** command to globally define an aggregate IP network address range for all access points on the GGSN, you can use the **aggregate** command to override this default address range at a particular access point. Automatic route aggregation can be configured at the

access-point configuration level only on the GGSN. The **gprs default aggregate** global configuration command does not support the **auto** option; therefore, you cannot configure automatic route aggregation globally on the GGSN.

The GGSN responds in the following manner to manage routes for MSs through an access point, when route aggregation is configured in the following scenarios:

- No aggregation is configured on the GGSN, at the APN or globally—The GGSN inserts the 32-bit host route of the MS into its routing table as a static route.
- A default aggregate route is configured globally, but no aggregation is configured at the APN:
 - If a statically or dynamically derived address for an MS matches the default aggregate route range, the GGSN inserts an aggregate route into its routing table.
 - If the MS address does not match the default aggregate route, the GGSN inserts the 32-bit host route as a static route into the routing table.
- A default aggregate route is configured globally, and automatic route aggregation is configured at the APN:
 - If a statically derived address for an MS matches the default aggregate route range, the GGSN inserts an aggregate route into its routing table.
 - If a statically derived address for an MS does not match the default aggregate route, the GGSN inserts the 32-bit host route as a static route into its routing table.
 - If a dynamically derived address for an MS is received, the GGSN aggregates the route based on the address and mask returned by the DHCP or RADIUS server.
- A default aggregate route is configured globally, and an aggregate route is also configured at the APN:
 - If a statically or dynamically derived address for an MS matches the aggregate range at the APN through which it was processed, or otherwise matches the default aggregate range, the GGSN inserts an aggregate route into its routing table.
 - If a statically or dynamically derived address for an MS does not match either the aggregate range at the APN, or the global default aggregate range, the GGSN inserts the 32-bit host route as a static route into its routing table.

Use care when assigning IP addresses to an MS before you configure the aggregation ranges on the GGSN. A basic guideline is to aggregate as many addresses as possible, but to minimize your use of aggregation with respect to the total amount of IP address space being used by the access point.


Note

The **aggregate** command and **gprs default aggregate** commands affect routing on the GGSN. Use care when planning and configuring IP address aggregation.

Examples

The following example shows a route aggregation configuration for access point 8 using DHCP on the GGSN, along with the associated output from the **show gprs gtp pdp-context all** command and the **show ip route** commands.

Notice that the **aggregate auto** command is configured at the access point where DHCP is being used. The **dhcp-gateway-address** command specifies the subnet addresses to be returned by the DHCP server. This address should match the IP address of a loopback interface on the GGSN. In addition, to accommodate route aggregation for another subnet 10.80.0.0, the **gprs default aggregate** global configuration command is used.

In this example, the GGSN aggregates routes for dynamically derived addresses for MSs through access point 8 based upon the address and mask returned by the DHCP server. For PDP context requests received for statically derived addresses on the 10.80.0.0 network, the GGSN also implements an aggregate route into its routing table, as configured by the **gprs default aggregate** command.

```
interface Loopback0
 ip address 10.80.0.1 255.255.255.255
!
interface Loopback2
 ip address 10.88.0.1 255.255.255.255
!
gprs access-point-list gprs
 access-point 8
  access-point-name pdn.aaaa.com
  ip-address-pool dhcp-proxy-client
  aggregate auto
  dhcp-server 172.16.43.35
  dhcp-gateway-address 10.88.0.1
  exit
!
gprs default aggregate 10.80.0.0 255.255.255.0
```

In the following output for the **show gprs gtp pdp-context all** command, 5 PDP context requests are active on the GGSN for pdn.aaaa.com from the 10.88.0.0/24 network:

```
router# show gprs gtp pdp-context all
TID           MS Addr           Source  SGSN Addr         APN
6161616161610001 10.88.0.1         DHCP    172.16.123.1     pdn.aaaa.com
6161616161610002 10.88.0.2         DHCP    172.16.123.1     pdn.aaaa.com
6161616161610003 10.88.0.3         DHCP    172.16.123.1     pdn.aaaa.com
6161616161610004 10.88.0.4         DHCP    172.16.123.1     pdn.aaaa.com
6161616161610005 10.88.0.5         DHCP    172.16.123.1     pdn.aaaa.com
```

The following output for the **show ip route** command shows a single static route in the IP routing table for the GGSN, which routes the traffic for the 10.88.0.0/24 subnet through the virtual template (or Virtual-Access1) interface:

```
router# show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter
       area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route
```

Gateway of last resort is not set

```

10.80.0.0/16 is subnetted, 1 subnets
C       10.80.0.0 is directly connected, Loopback0
10.113.0.0/16 is subnetted, 1 subnets
C       10.113.0.0 is directly connected, Virtual-Access1
172.16.0.0/16 is variably subnetted, 3 subnets, 3 masks
C       172.16.43.192/28 is directly connected, FastEthernet0/0
S       172.16.43.0/24 is directly connected, FastEthernet0/0
S       172.16.43.35/32 is directly connected, Ethernet2/3
10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
U       10.88.0.0/24 [1/0] via 0.0.0.0, Virtual-Access1
C       10.88.0.0/16 is directly connected, Loopback2
```

Related Commands

Command	Description
aggregate	Configures the GGSN to create an aggregate route in its IP routing table when receiving PDP requests from MSs on the specified network for a particular access point on the GGSN.
show gprs access-point	Displays information about access points on the GGSN.

gprs default charging-gateway

To specify the default charging gateway, use the **gprs default charging gateway** global configuration command. To remove the charging gateway, use the **no** form of this command.

```
gprs default charging-gateway {ip-address | name} [{ip-address | name}]
```

```
no gprs default charging-gateway {ip-address | name} [{ip-address | name}]
```

Syntax Description

<i>ip-address</i>	IP address of a default gateway.
<i>name</i>	Host name for a default gateway.

Defaults

No default charging gateway is assigned.

Command Modes

Global configuration

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **gprs default charging-gateway** command to specify the IP address or host name of a default charging gateway that the GGSN uses to communicate charging information. If you specify two gateways, then the first gateway is the primary gateway, and the second gateway is the backup.

Examples

The following example specifies two default charging gateway IP addresses:

```
gprs default charging-gateway 10.100.0.3 10.100.0.2
```

Related Commands

Command	Description
gprs charging container volume-threshold	Specifies the maximum number of bytes that the GGSN maintains across all containers for a particular PDP context before closing and updating the CDR.
gprs charging flow-control private-echo	Implements an echo request with private extensions for maintaining flow control on packets transmitted to the charging gateway.

Command	Description
gprs charging packet-queue-size	Specifies the maximum number of unacknowledged charging data transfer requests that the GGSN maintains in its queue.
gprs charging server-switch-timer	Specifies a timeout value that determines when the GGSN attempts to find an alternate charging gateway after a destination charging gateway cannot be located or becomes unusable.
gprs charging tariff-time	Specifies a time of day when GPRS charging tariffs change.
gprs charging message transfer-response number-responded	Specifies the number of seconds that the GGSN waits before it transfers charging data to the charging gateway.
show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs default dhcp-server

To specify a default Dynamic Host Configuration Protocol (DHCP) server from which the GGSN obtains IP address leases for mobile users, use the **gprs default dhcp-server** global configuration command. To remove the default DHCP server, use the **no** form of this command.

```
gprs default dhcp-server {ip-address | name} [{ip-address | name}]
```

```
no gprs default dhcp-server {ip-address | name} [{ip-address | name}]
```

Syntax Description

<i>ip-address</i>	IP address of a DHCP server. The first IP address is the name of the primary DHCP server. The second (optional) <i>ip-address</i> argument specifies the IP address of a backup DHCP server.
<i>name</i>	Host name of a DHCP server. The second (optional) <i>name</i> argument specifies the host name of a backup DHCP server.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **gprs default dhcp-server** command to specify a DHCP server from which the GGSN obtains IP address leases for mobile users across all access points. Use the optional second set of arguments to specify the name, or IP address, of a backup DHCP server to use if the primary DHCP server is unavailable. If you do not specify a backup DHCP server, then no backup DHCP server is available.

In addition to specifying a DHCP server for the GGSN, you must also specify the GGSN as a DHCP proxy client. You can configure the GGSN as a DHCP proxy client using either the **gprs default ip-address-pool dhcp-proxy-client** global configuration command, or the **ip-address-pool dhcp-proxy-client** access-point configuration command.

You can override the DHCP server that is configured globally, and specify a different DHCP server for a particular access point using the **dhcp-server** access-point configuration command. If you do not specify a DHCP server for a specified access point, then the DHCP server specified with the **gprs default dhcp-server** command is used for that access point.

**Note**

You cannot specify a DHCP server that is located within a private network using VRF with the **gprs default dhcp-server global configuration** command. To specify a DHCP server that is within a VRF address space, you must use the **dhcp-server** access-point configuration command.

Examples

The following example specifies 10.101.100.3 as the GPRS default DHCP server for GPRS, using the **gprs default dhcp-server** command. Although this DHCP server is also configured globally on the router using the **ip dhcp-server** global configuration command, this is not required.

Because DHCP is the default dynamic addressing method specified by the **gprs default ip-address-pool dhcp-proxy-client** command, access-point 3 will use the DHCP server located at 10.101.100.3 for IP addressing support. Access-point 1 and access-point 2 override the default DHCP server using the **dhcp-server** access-point configuration command to specify alternative DHCP servers:

```
interface Loopback1
 ip address 10.30.30.30 255.255.255.255
!
interface Loopback2
 ip address 10.27.27.27 255.255.255.255
!
interface Loopback3
 ip address 10.25.25.25 255.255.255.255
!
interface loopback 1
 ip address 10.15.10.1 255.255.255.0
!
interface Virtual-Template1
 ip unnumber loopback 1
 no ip directed-broadcast
 encapsulation gtp
 gprs access-point-list abc
!
gprs access-point-list abc
 access-point 1
  access-point-name gprs.pdn1.com
  dhcp-server 10.102.100.3
  dhcp-gateway-address 10.30.30.30
  exit
!
 access-point 2
  access-point-name gprs.pdn2.com
  dhcp-server 10.60.0.1
  dhcp-gateway-address 10.27.27.27
  exit
!
 access-point 3
  access-point-name www.pdn3.com
  access-mode non-transparent
  dhcp-gateway-address 10.25.25.25
  exit
!
gprs default ip-address-pool dhcp-proxy-client
gprs default dhcp-server 10.101.100.3
```

Related Commands

Command	Description
dhcp-server	Specifies a primary (and backup) DHCP server to allocate IP addresses to MS users entering a particular PDN access point.
gprs default ip-address-pool	Specifies a dynamic address allocation method using IP address pools for the GGSN.
ip-address-pool	Specifies a dynamic address allocation method using IP address pools for the current access point.

gprs default ip-address-pool

To specify a dynamic address allocation method using IP address pools for the GGSN, use the **gprs default ip-address-pool** global configuration command. To disable dynamic address allocation, use the **no** form of this command.

```
gprs default ip-address-pool { dhcp-proxy-client | disable | radius-client }
```

```
no gprs default ip-address-pool { dhcp-proxy-client | disable | radius-client }
```

Syntax Description

dhcp-proxy-client	GGSN dynamically acquires IP addresses for an MS from a DHCP server.
disable	Disables dynamic address allocation by the GGSN.
radius-client	GGSN dynamically acquires IP addresses for an MS from a RADIUS server.

Defaults

IP address pools are disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **gprs default ip-address-pool** command to specify the method by which the GGSN obtains address leases for mobile stations across all access points.

If you specify **dhcp-proxy-client** for the GPRS default IP address pool, then you must specify a DHCP server for address allocation. To specify a DHCP server, use either the **gprs default dhcp-server** global configuration command, or the **dhcp-server** access-point configuration command.

If you specify **radius-client** as the method for IP address allocation, then you must configure RADIUS services at the GGSN. This involves configuring AAA server groups using the **gprs default aaa-group** or **aaa-group** commands, and configuring the **radius-server host** commands to specify the RADIUS servers that provide the address pool. You also need to configure AAA on the GGSN. For more information about configuring RADIUS on the GGSN, refer to the Usage Guidelines section for the **aaa-group** and **gprs default aaa-group** commands.

To disable the selected IP address allocation method, use the **no** form of this command or issue the command with the **disable** keyword (the default form of this command).

Examples

The following example specifies **gprs default ip-address-pool dhcp-proxy-client** as the dynamic address allocation method for the GGSN across all access points.

Access-point 3 overrides the default by specifying **ip-address-pool radius-client** as the dynamic address allocation method for that access point. The corresponding RADIUS and AAA configuration is also shown as an example.

```

aaa new-model
!
aaa group server radius foo
  server 10.2.3.4
  server 10.6.7.8
!
aaa authentication ppp foo group foo
aaa authorization network default group radius
aaa accounting exec default start-stop group foo
!
interface Loopback1
  ip address 10.30.30.30 255.255.255.255
!
interface Loopback2
  ip address 10.27.27.27 255.255.255.255
!
interface loopback 1
  ip address 10.15.10.1 255.255.255.0
!
interface Virtual-Template1
  ip unnumber loopback 1
  encapsulation gtp
  gprs access-point-list abc
!
gprs access-point-list abc
  access-point 1
    access-point-name gprs.pdn1.com
    dhcp-server 10.102.100.3
    dhcp-gateway-address 10.30.30.30
    exit
!
  access-point 2
    access-point-name gprs.pdn2.com
    dhcp-server 10.60.0.1
    dhcp-gateway-address 10.27.27.27
    exit
!
  access-point 3
    access-point-name www.pdn3.com
    access-mode non-transparent
    ip-address-pool radius-client
    aaa-group authentication foo
    exit
!
gprs default ip-address-pool dhcp-proxy-client
gprs default dhcp-server 10.101.100.3
!
radius-server host 10.2.3.4 auth-port 1645 acct-port 1646 non-standard
radius-server host 10.6.7.8 auth-port 1645 acct-port 1646 non-standard
radius-server key ggsntel

```

Related Commands	Command	Description
	dhcp-server	Specifies a primary (and backup) DHCP server to allocate IP addresses to MS users entering a particular PDN access point.
	gprs default dhcp-server	Specifies a default DHCP server from which the GGSN obtains IP address leases for mobile users.
	ip-address-pool	Specifies a dynamic address allocation method using IP address pools for the current access point.
	aaa-group	Specifies a AAA server group and assigns the type of AAA services to be supported by the server group for a particular access point on the GGSN.
	gprs default aaa-group	Specifies a default AAA server group and assigns the type of AAA services to be supported by the server group for all access points on the GGSN.

gprs default map-converting-gsn

To specify the IP address or host name of the primary (and backup) GSN to communicate with the HLR in sending and receiving MAP messages, use the **gprs default map-converting-gsn** global configuration command. To remove the GSN configuration, use the **no** form of this command.

```
gprs default map-converting-gsn {ip-address | hostname} [ip-address | hostname]
```

```
no gprs default map-converting-gsn {ip-address | hostname} [ip-address | hostname]
```

Syntax Description

<i>ip-address</i>	IP address of the GSN handling MAP messages with the HLR. The first <i>ip-address</i> argument specifies the IP address of the primary GSN. The second (optional) <i>ip-address</i> argument specifies the IP address of a backup GSN.
<i>hostname</i>	Host name of the GSN handling MAP messages with the HLR. The second (optional) <i>name</i> argument specifies the host name of a backup GSN.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **gprs default map-converting-gsn** command to identify an GSN that can convert GTP messages to and from Mobile Application Protocol (MAP) messages. This GTP-to-MAP and MAP-to-GTP conversion allows the GSN to communicate with an HLR.

The GGSN must be able to send MAP messages to an HLR to support network-initiated PDP requests. Network-initiated PDP requests are one example of an application that requires this MAP conversion function.

The GGSN supports a maximum of two protocol-converting GSNs. Therefore, you can specify both a primary and backup GSN using a single **gprs default map-converting-gsn** command. However, you cannot configure more than one instance of the **gprs default map-converting-gsn** command.

The GGSN uses the backup GSN when the GGSN reaches the maximum signaling threshold (N3 GTP signaling requests x T3).

In addition to configuring the **gprs default map-converting-gsn** command, you must configure the following other commands to support network-initiated PDP requests on the GGSN:

- **gprs ni-pdp ip-imsi single**
- **network-request-activation**

Examples

The following example configures the GSN, located at IP address 172.16.10.10, to convert MAP messages between the HLR and the GGSN:

```
gprs default map-converting-gsn 172.16.10.10
```

Related Commands

Command	Description
gprs ni-pdp ip-imsi single	Specifies a static IP address to IMSI mapping for a single MS for network-initiated PDP requests from a particular APN.
network-request-activation	Enables an access point to support network-initiated PDP requests to a MS.

gprs delay-qos map tos

To specify a QoS mapping from the delay QoS classes to an IP type of service (ToS) precedence value, use the **gprs delay-qos map tos class** global configuration command. To return to the default values, use the **no** form of this command.

```
gprs delay-qos map tos class1 tos-value [class2 tos-value [class3 tos-value [class-best-effort
tos-value]]]
```

```
no gprs delay-qos map tos class1 tos-value [class2 tos-value [class3 tos-value [class-best-effort
tos-value]]]
```

Syntax Description		
class1 <i>tos-value</i>	ToS mapping for a delay1 class QoS. The <i>tos-value</i> can be a number from 0 to 4. The default is 3.	
class2 <i>tos-value</i>	ToS mapping for a delay2 class QoS. The <i>tos-value</i> can be a number from 0 to 4. The default is 2.	
class3 <i>tos-value</i>	ToS mapping for a delay3 class QoS. The <i>tos-value</i> can be a number from 0 to 4. The default is 1.	
class-best-effort <i>tos-value</i>	ToS mapping for a delaybesteffort class QoS. The <i>tos-value</i> can be a number from 0 to 4. The default is 0.	

Defaults

The default value for the class1 ToS category is 3.

The default value for the class2 ToS category is 2.

The default value for the class3 ToS category is 1.

The default value for the class-best-effort ToS category is 0.

Command Modes

Global configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **gprs delay-qos map tos** command to specify a mapping between various QoS categories and the ToS precedence bits in the IP header for packets transmitted over the Gn interface (GTP tunnels).



Note

You must enable delay QoS mapping by configuring the **gprs qos map delay** command *before* configuring the **gprs delay-qos map tos** command.

The **class2**, **class3** and **class-best-effort** keyword arguments are optional. However, if you specify a value for the **class3** argument, you must specify a value for the **class2** argument. And, if you specify a value for the **class-best-effort** argument, then you must specify a value for both the **class2** and the **class3** arguments.

Only ToS classes 0 through 5 will be used for GGSN signaling and user data. The GTP signaling message should have the highest precedence. ToS class 5 is the default ToS for GTP signaling. Use the **gprs gtp map signalling tos** command to specify an IP ToS mapping for GTP signaling packets.

The ToS precedence classes are defined as follows:

- 0 Routine
- 1 Priority
- 2 Immediate
- 3 Flash
- 4 Flash Override
- 5 Critical ECP
- 6 Internetwork Control
- 7 Network Control

Examples

The following example specifies a QoS mapping from the delay QoS classes to a class1 ToS category of four, a class2 ToS category of three, a class3 ToS category of two, and a best-effort ToS category of one.

```
gprs delay-qos map tos class1 4 class2 3 class3 2 class-best-effort 1
```

Related Commands

Command	Description
gprs gtp map signalling tos	Specifies an IP ToS mapping for GPRS signaling packets.
gprs qos default-response requested	Configures the GGSN to set its default QoS values in the response message exactly as requested in the create PDP context request message.
gprs qos map delay	Enables mapping of GPRS QoS categories to a delay QoS method that includes the delaybesteffort, delay1, delay2, and delay3 classes.

gprs dfp max-weight

To specify the maximum weight sent to a DFP manager by a GGSN acting as a DFP agent, use the **gprs dfp max-weight** global configuration command. To return to the default value, use the **no** form of this command.

```
gprs dfp max-weight [max-weight-value]
```

```
no gprs dfp max-weight [max-weight-value]
```

Syntax Description	<i>max-weight-value</i>	Specifies the maximum weight sent by the GGSN, acting as a DFP agent, to a DFP manager. The valid range is 1 to 100. The default value is 8.
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Defaults	8
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Command Modes	Global configuration
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Command History	Release	Modification
	12.1(9)E	This command was introduced.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines If you use DFP with GPRS load balancing, you must also specify a maximum number of PDP contexts for each GGSN, using the **gprs maximum-pdp-context-allowed** command. *Do not* accept the default value of 10000 PDP contexts. A value of **45000** is recommended. Significantly lower values can impact performance in a GPRS load-balancing environment.



Note

For more information about configuring GPRS load balancing, see the *IOS Server Load Balancing, 12.1(9)E* documentation located at Cisco.com at the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121limit/121e/121e9/index.htm>

Examples The following example sets the maximum weight sent by GGSN to 43:

```
gprs dfp max-weight 43
```

Related Commands

Command	Description
agent	Identifies a DFP agent to which IOS SLB can connect.
gprs maximum-pdp-context-allowed	Specifies the maximum number of PDP contexts (mobile sessions) that can be activated on the GGSN.
ip dfp agent	Identifies a DFP agent subsystem and enters DFP agent configuration mode.
ip slb dfp	Configures DFP, supplies an optional password, and enters DFP configuration mode.

gprs gtp-director retry-timeout

To specify the amount of time during which GDM forwards all retries of create PDP context requests for a specific TID from an SGSN to the same GGSN, use the **gprs gtp-director retry-timeout** global configuration command. To return to the default value, use the **no** form of this command.

gprs gtp-director retry-timeout *seconds*

no gprs gtp-director retry-timeout *seconds*

Syntax Description

seconds Number of seconds (between 1 and 65535) during which GDM forwards retries for a specific TID to the same GGSN. The default is 30 seconds.

Defaults

30 seconds

Command Modes

Global configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **gprs gtp-director retry-timeout** command only when configuring the GTP Director Module (GDM). Do not configure this command on a GGSN.

Use the **gprs gtp-director retry-timeout** command to specify how long GDM forwards all retries of create PDP context requests for a specific TID from an SGSN to the same GGSN. The retry-timeout value represents the maximum period of time during which GDM expects the real GGSN to establish or reject the PDP context request.

It is recommended that the retry-timeout value be specified according to the following formula:

$$T \geq (N3 \cdot T3 + B),$$

where

- T is the GDM retry-timeout. This is the value that you need to determine for the **gprs gtp-director retry-timeout** command on the GDM router.
- N3 is the retry count that is configured on the SGSN.
- T3 is the retry timer that is configured on the SGSN.
- B is some integer that you choose as a buffer factor. The buffer factor is suggested to allow sufficient time for routing and processing the request by the real GGSN.

**Note**

You can configure the **gprs gtp-director retry-timeout** command in real time for GDM. The new value will be used for create PDP context requests coming in for any new TIDs. The new value is not retroactive for existing TIDs. Therefore, the old value is used for any PDP context requests for an existing TID.

Examples

The following example configures GDM to forward all retries of create PDP context requests for a specific TID to the same GGSN for 1 minute:

```
gprs gtp-director retry-timeout 60
```

Related Commands

Command	Description
service gprs gtp-director	Configures a router for GTP director module functions.

gprs gtp echo-timer dynamic enable

To enable the dynamic echo timer on the GGSN, use the **gprs gtp echo-timer dynamic enable** global configuration command. To disable the dynamic echo timer, use the **no** form of this command.

gprs gtp echo-timer dynamic enable

no gprs gtp echo-timer dynamic enable

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Global configuration

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines For a GTP path to be active, the SGSN needs to be active. To determine that an SGSN is active, the GGSN and SGSN exchange echo messages. Although the GGSN supports different methods of echo message timing, the basic echo flow begins when the GGSN sends an echo request message to the SGSN. The SGSN sends a corresponding echo response message back to the GGSN.

If the GGSN does not receive a response after a certain number of retries (a configurable value), the GGSN assumes that the SGSN is not active. This indicates a GTP path failure, and the GGSN clears all PDP context requests associated with that path.

The GGSN supports two different methods of echo timing—the default echo timer and the dynamic echo timer.

The GGSN's default echo timer can not be configured to accommodate network congestion and therefore the GTP path could be cleared prematurely. The dynamic echo timer feature enables the GGSN to better manage the GTP path during periods of network congestion. Use the **gprs gtp echo-timer dynamic enable** command to enable the GGSN to perform dynamic echo timing.

Default echo timer

The dynamic echo timer is based on the default echo timer in the GGSN. A description of the default echo timer follows as a means of comparison.

The default echo timer configuration uses the following commands:

- **gprs gtp n3-requests**—Specifies maximum number of times that the GGSN attempts to send an echo-request message. The default is 5 times.
- **gprs gtp path-echo-interval**—Specifies the number of seconds that the GGSN waits before sending an echo-request message to the SGSN. The default is 60 seconds.
- **gprs gtp t3-response**—Specifies the number of seconds that the GGSN waits before resending an echo-request message after the path echo interval has expired and the echo response from the SGSN has not been received. The default is 1 second.

If the GGSN receives the echo response within the path echo interval (as specified in the **gprs gtp path-echo-interval** command; default is 60 seconds), it sends another echo request message after 60 seconds (or whatever time was configured in the **gprs gtp path-echo-interval** command). This message flow continues as long as the GGSN receives an echo response message from the SGSN within the specified path echo interval.

If the GGSN fails to receive an echo response message from the SGSN within the path echo interval, it resends echo request messages until the N3-requests counter is reached (as specified by the **gprs gtp n3-requests** command; default is 5). Because the initial request message is included in the N3-requests counter, the total number of retries is N3-1. The T3 timer increases by a factor of two for each retry (the factor value is not configurable).

For example, if N3 is set to the default of 5, and T3 is set to the default of 1 second, the GGSN will resend 4 echo request messages (the initial request + 4 retries=5). The T3 time increments for each additional echo request, by a factor of 2 seconds. So, the GGSN resends a message in 2 seconds, 4 seconds, 8 seconds, and 16 seconds. If the GGSN fails to receive an echo response message from the SGSN within the time period of the N3-requests counter, it clears the GTP path and deletes all of the PDP contexts.

For the above example, the total elapsed time from when the first request message is sent, to when the GTP path is cleared, is: $60+2+4+8+16=90$ seconds,

where 60 is the initial value of the path echo interval, and the remaining 4 time periods are the increments of the T3 timer for the subsequent retries.

Dynamic echo timer

The dynamic echo timer method is different from the default echo timer method on the GGSN because it uses a calculated round-trip timer (RTT), as well as a configurable factor or multiplier to be applied to the RTT statistic.

The dynamic echo timer configuration uses the following commands:

- **gprs gtp echo-timer dynamic enable**—Enables the dynamic echo timer on the GGSN.
- **gprs gtp echo-timer dynamic minimum**—Specifies the minimum time period (in seconds) for the dynamic echo timer. If the RTT is less than this value, the GGSN uses the value set in this command.
- **gprs gtp echo-timer dynamic smooth-factor**—Configures the multiplier that the dynamic echo timer uses when calculating the time to wait to send retries, when it has not received a response from the SGSN within the path echo interval.
- **gprs gtp n3-requests**—Specifies the maximum number of times that the GGSN attempts to send an echo-request message. The default is 5 times.
- **gprs gtp path-echo-interval**—Specifies the number of seconds within which the GGSN expects to receive an echo response from the SGSN. This is the period of time that the GGSN waits before sending another echo-request message. The default is 60 seconds.

The GGSN calculates the RTT statistic for use by the dynamic echo timer feature. The RTT is the amount of time between sending a particular echo request message and receiving the corresponding echo response message. RTT is calculated for the first echo response received; the GGSN records this statistic. Because the RTT value might be a very small number, there is a minimum time for the dynamic echo timer to use. This value is configured using the **gprs gtp echo-timer dynamic minimum** command.

If the GGSN fails to receive an echo response message from the SGSN within the path echo interval, it goes into retransmission, or path failure mode. During path failure mode, the GGSN uses a value referred to as the T-dynamic. The T-dynamic is the greater of either the dynamic minimum, or the RTT statistic multiplied by the smooth factor.

The T-dynamic essentially replaces the use of the **gprs gtp t3-response** command, which is used in the default echo timer method on the GGSN. The T-dynamic timer increases by a factor of two for each retry (again, this factor is not configurable), until the N3-requests counter is reached (N3-requests counter includes the initial request message).

For example, if the RTT is 6 seconds, N3 is set to 5, and the smooth factor is set to 3, the GGSN will resend 4 echo request messages in path failure mode. The T-dynamic value is 18 (RTT x smooth factor), so the GGSN sends a retry echo request message in 36 seconds, 72 seconds, 144 seconds, and 288 seconds. If the GGSN fails to receive an echo response message from the SGSN in this time period, it clears the GTP path and deletes all PDP contexts. The total elapsed time from when the first request message is sent to when the GTP path is cleared is: $60+36+72+144+288=600$ seconds,

where 60 is the initial value of the path echo interval, and the remaining 4 time periods are the increments of the T-dynamic for the subsequent retries.

Examples

The following example turns on the dynamic echo timer, sets the minimum value to 5 seconds, and configures a smooth factor of 3:

```
gprs gtp echo-timer dynamic enable
gprs gtp echo-timer dynamic minimum 5
gprs gtp echo-timer dynamic smooth-factor 3
```

Related Commands

Command	Description
gprs gtp echo-timer dynamic minimum	Specifies the minimum time period used by the dynamic echo timer.
gprs gtp echo-timer dynamic smooth-factor	Configures the multiplier that the GGSN uses to calculate the time to wait to send retries of the dynamic echo timer.
gprs gtp n3-requests	Specifies the maximum number of times that the GGSN attempts to send a signaling request.
gprs gtp path-echo-interval	Specifies the number of seconds that the GGSN waits before sending an echo-request message to the SGSN.

gprs gtp echo-timer dynamic minimum

To specify the minimum time period used by the dynamic echo timer, use the **gprs gtp echo-timer dynamic minimum** global configuration command. To return to the default value, use the **no** form of this command.

gprs gtp echo-timer dynamic minimum *number*

no gprs gtp echo-timer dynamic minimum *number*

Syntax Description	<i>number</i>	Minimum time period (between 1 and 60 seconds) of the dynamic echo timer. Value must be an integer. The default value is 5 seconds.
---------------------------	---------------	---

Defaults	5 seconds
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Command Modes	Global configuration
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Command History	Release	Modification
	12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.	
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.	

Usage Guidelines Use this command to specify the minimum time period (in seconds) used by the dynamic echo timer, also referred to as the T-dynamic. If the GGSN's current calculation of the round-trip timer (RTT) statistic, multiplied by the smooth factor, is less than the configured dynamic minimum value, then the GGSN uses the configured minimum as the T-dynamic.

The GGSN calculates the RTT statistic for use by the dynamic echo timer feature. The RTT is the amount of time between sending a particular echo request message and receiving the corresponding echo response message. RTT is calculated for the first echo response received; the GGSN records this statistic. Because the RTT value might be a very small number, there is a minimum time for the dynamic echo timer to use. This value is configured using the **gprs gtp echo-timer dynamic minimum** command.

If the GGSN fails to receive an echo response message from the SGSN within the path echo interval, it goes into retransmission, or path failure mode. During path failure mode, the GGSN uses a value referred to as the T-dynamic. The T-dynamic is the greater of either the dynamic minimum, or the RTT statistic multiplied by the smooth factor.

The T-dynamic essentially replaces the use of the **gprs gtp t3-response** command, which is used in the default echo timer method on the GGSN. The T-dynamic timer increases by a factor of two for each retry (again, this factor is not configurable), until the N3-requests counter is reached (N3-requests counter includes the initial request message).

**Note**

For more information about the dynamic echo timer on the GGSN, refer to the Usage Guidelines section for the **gprs gtp echo-timer dynamic enable** command.

Examples

The following example turns on the dynamic echo timer, sets the minimum value to 6 seconds, and configures a smooth factor of 2:

```
gprs gtp echo-timer dynamic enable
gprs gtp echo-timer dynamic minimum 6
gprs gtp echo-timer dynamic smooth-factor 2
```

Related Commands

Command	Description
gprs gtp echo-timer dynamic enable	Enables the dynamic echo timer on the GGSN.
gprs gtp echo-timer dynamic smooth-factor	Configures the multiplier that the GGSN uses to calculate the time to wait to send retries of the dynamic echo timer.
gprs gtp n3-requests	Specifies the maximum number of times that the GGSN attempts to send a signaling request.
gprs gtp path-echo-interval	Specifies the number of seconds that the GGSN waits before sending an echo-request message to the SGSN.

gprs gtp echo-timer dynamic smooth-factor

To configure the multiplier that the GGSN uses to calculate the time to wait to send retries of the dynamic echo timer, use the **gprs gtp echo-timer dynamic smooth-factor** global configuration command. To return to the default value, use the **no** form of this command.

gprs gtp echo-timer dynamic smooth-factor *number*

no gprs gtp echo-timer dynamic smooth-factor *number*

Syntax Description	<i>number</i>	Integer (between 1 and 100) used by the GGSN as a multiplier for the RTT statistic, to calculate the T-dynamic. The default is 2.
---------------------------	---------------	---

Defaults	2
-----------------	---

Command Modes	Global configuration
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Command History	Release	Modification
	12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.	
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.	

Usage Guidelines	The dynamic echo timer uses the smooth factor to calculate what is known as the T-dynamic. The T-dynamic is calculated by multiplying the RTT (or the value configured in the gprs gtp echo-timer dynamic minimum , whichever is greater) times the smooth-factor.
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Note	Refer to the Usage Guidelines section for the gprs gtp echo-timer dynamic enable command for a detailed explanation of how the dynamic echo timer works.
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Examples	The following example turns on the dynamic echo timer, sets the minimum value to 1 second, and configures a smooth factor of 2:
-----------------	---

```
gprs gtp echo-timer dynamic enable
gprs gtp echo-timer dynamic minimum 1
gprs gtp echo-timer dynamic smooth-factor 2
```

Related Commands	Command	Description
	gprs gtp echo-timer dynamic enable	Enables the dynamic echo timer on the GGSN.
	gprs gtp echo-timer dynamic minimum	Specifies the minimum time period used by the dynamic echo timer.
	gprs gtp n3-requests	Specifies the maximum number of times that the GGSN attempts to send a signaling request.
	gprs gtp path-echo-interval	Specifies the number of seconds that the GGSN waits before sending an echo-request message to the SGSN.
	gprs gtp t3-response	Specifies the initial time that the GGSN waits before resending a signaling request message when a response to a request has not been received

gprs gtp error-indication-throttle

To specify the maximum number of error indication messages that the GGSN sends out in one second, use the **gprs gtp error-indication-throttle** command. To disable the GGSN from sending error indication messages, use the **no** form of this command.

gprs gtp error-indication-throttle window-size *size*

no gprs gtp error-indication-throttle

Syntax Description

<i>size</i>	Integer (between 0 and 256) that specifies the maximum number of error indication messages that the GGSN sends in one second.
-------------	---

Defaults

Disabled

Command Modes

Global configuration

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **gprs gtp error-indication-throttle** command to specify the maximum number of error indication messages that are sent by the GGSN in one second. This provides a way to implement flow control for transmission of GTP error messages. This command sets the initial value of a counter which is decremented each time an error indication message is sent. When the counter reaches zero, the GGSN stops transmitting error indication messages. The GGSN resets this counter to the configured throttle value after one second.

If you do not issue the command, error indication throttling is not enabled. To restore the default value (error indication throttling is disabled) use the **no** form of this command.

Examples

The following example shows a throttle value of 150:

```
gprs gtp error-indication-throttle window-size 150
```

gprs gtp ip udp ignore checksum

To disable verification of the user datagram protocol (UDP) checksum to support CEF switching on the GGSN, use the **gprs gtp ip udp ignore checksum** global configuration command. To enable UDP checksum verification on the GGSN, use the **no** form of this command.

gprs gtp ip udp ignore checksum

no gprs gtp ip udp ignore checksum

Syntax Description This command has no arguments or keywords.

Defaults UDP checksum verification is enabled on the GGSN.

Command Modes Global configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

UDP checksum verification can prohibit operation of CEF switching processing on the GGSN if the checksum should have a non-zero result. Therefore, if you want to enable CEF switching on the GGSN, you should configure the **gprs gtp ip udp ignore checksum** command.

If UDP checksum verification remains enabled on the GGSN and a non-zero result occurs, the GTP T-PDUs will be process switched, even if you have configured the GGSN for CEF switching.

The **gprs gtp ip udp ignore checksum** command does not apply if you are only using process switching on the GGSN.

For more information about switching processes on the router, refer to the *Cisco IOS Switching Services Configuration Guide*.

Examples

The following example disables UDP checksum verification on the GGSN:

```
gprs gtp ip udp ignore checksum
```

Related Commands

Command	Description
ip cef	Enables CEF on the route processor card.

gprs gtp map signalling tos

To specify an IP ToS mapping for GPRS tunneling protocol (GTP) signaling packets, use the **gprs gtp map signalling tos** global configuration command. To return to the default value, use the **no** form of this command.

```
gprs gtp map signalling tos tos-value
```

```
no gprs gtp map signalling tos tos-value
```

Syntax Description	<i>tos-value</i>	Value between 0 and 7 that specifies the IP ToS mapping. The default value is 5.
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Defaults	ToS value 5
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Command Modes	Global configuration
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Command History	Release	Modification
	12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.	
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.	
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.	
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.	

Usage Guidelines	Use the gprs gtp map signalling tos command to specify the IP ToS mapping for GTP signaling packets transmitted by the GGSN. The higher the value, the higher the class of service provided to the packets.
-------------------------	--

Examples	The following example specifies a IP ToS mapping value of 3:
-----------------	--

```
gprs gtp map signalling tos 3
```

Related Commands	Command	Description
	gprs canonical-qos map tos	Specifies a QoS mapping from the canonical QoS classes to an IP ToS category.
gprs charging container volume-threshold	Specifies the maximum number of bytes that the GGSN maintains in a user's charging container before closing the charging container and updating the CDR.	
gprs charging map data tos	Specifies an IP ToS mapping for GPRS charging data packets.	

Command	Description
gprs charging packet-queue-size	Specifies the maximum number of unacknowledged charging data transfer requests that the GGSN maintains in its queue.
gprs charging message transfer-response number-responded	Specifies the number of seconds that the GGSN waits before it transfers charging data to the charging gateway.

gprs gtp n3-buffer-size

To specify the size of the receive buffer that the GGSN uses to receive GTP signaling messages and packets sent through the tunneling protocol, use the **gprs gtp n3-buffer-size** global configuration command. To return to the default value, use the **no** form of this command.

gprs gtp n3-buffer-size *bytes*

no gprs gtp n3-buffer-size

Syntax Description	<i>bytes</i>	Number of bytes (between 2048 and 65535) that specifies the size of the N3 buffer. The default is 8192 bytes.
---------------------------	--------------	---

Defaults	8192 bytes
-----------------	------------

Command Modes	Global configuration
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Command History	Release	Modification
	12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.	
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.	
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.	
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.	

Usage Guidelines	Use the gprs gtp n3-buffer-size command to specify the size of the GTP N3 buffer on the GGSN. The N3 buffer is a receive buffer that the GGSN uses to receive GTP signaling messages and packets sent through the tunneling protocol. The recommended value for the N3 buffer size is 8192 (the default size).
-------------------------	---

Examples	The following example specifies a buffer size of 2084 bytes: <pre>gprs gtp n3-buffer-size 2084</pre>
-----------------	---

gprs gtp n3-requests

To specify the maximum number of times that the GGSN attempts to send a signaling request to an SGSN, use the **gprs gtp n3-requests** global configuration command. To return to the default value, use the **no** form of this command.

gprs gtp n3-requests *requests*

no gprs gtp n3-requests *requests*

Syntax Description	<i>requests</i>	A number between 1 and 65535 that specifies the number of times a request is attempted. The default is 5 requests.
---------------------------	-----------------	--

Defaults	5 requests
-----------------	------------

Command Modes	Global configuration
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Command History	Release	Modification
	12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.	
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.	
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.	
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.	

Usage Guidelines	<p>The value of the gprs gtp n3-requests command is used for all signaling requests on the GGSN.</p> <p>The GGSN supports two different methods of echo timing—the default echo timer and the dynamic echo timer. The gprs gtp n3-requests command is used by the GGSN to perform either type of echo processing.</p>
-------------------------	---

Examples	<p>The following example shows the GGSN attempting to send a signaling request 3 times:</p> <pre>gprs gtp n3-requests 3</pre>
-----------------	---

Related Commands	Command	Description
	gprs gtp echo-timer dynamic enable	Enables the dynamic echo timer on the GGSN.
gprs gtp n3-buffer-size	Specifies the size of the receive buffer that the GGSN uses to receive GTP signaling messages and packets sent through the tunneling protocol.	

Command	Description
gprs gtp path-echo-interval	Specifies the number of seconds that the GGSN waits before sending an echo-request message to the SGSN.
gprs gtp t3-response	Specifies the initial time that the GGSN waits before resending a signaling request message when a response to a request has not been received.

gprs gtp path-echo-interval

To specify the number of seconds that the GGSN waits before sending an echo-request message to the SGSN, use the **gprs gtp path-echo-interval** global configuration command. To return to the default value, use the **no** form of this command.

```
gprs gtp path-echo-interval interval
```

```
no gprs gtp path-echo-interval interval
```

Syntax Description

<i>interval</i>	Number of seconds that the GGSN waits before sending an echo-request message. Specify a value between 60 and 65535 seconds. The value 0 disables the echo-request feature. The default is 60 seconds.
-----------------	---

Defaults

60 seconds

Command Modes

Global configuration mode

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

The GGSN supports two different methods of echo timing—the default echo timer and the dynamic echo timer. The **gprs gtp path-echo-interval** command is used on the GGSN to perform either type of echo processing.

Use the **gprs gtp path-echo-interval** command to specify the interval that the GGSN waits before sending an echo-request message to the SGSN to check for GTP path failure.



Note

A value of 0 seconds disables echo requests on the GGSN.

Examples

The following example shows the GGSN waiting 90 seconds before sending an echo-request message:

```
gprs gtp path echo-interval 90
```

Related Commands

Command	Description
gprs gtp echo-timer dynamic enable	Enables the dynamic echo timer on the GGSN.
gprs gtp n3-requests	Specifies the maximum number of times that the GGSN attempts to send a signaling request to an SGSN.
gprs gtp t3-response	Specifies the initial time that the GGSN waits before resending a signaling request message when a response to a request has not been received.

gprs gtp ppp vtemplate

To associate the virtual template interface that defines the PPP characteristics with support for the PPP PDP type over GTP on the GGSN, use the **gprs gtp ppp vtemplate** global configuration command. To remove specification of the PPP virtual template interface for GTP on the GGSN, use the **no** form of this command.

gprs gtp ppp vtemplate *number*

no gprs gtp ppp vtemplate *number*

Syntax Description

number

Integer identifier of the virtual template interface over which the PPP characteristics are defined on the GGSN. This number must match the number configured in the corresponding **interface virtual-template** command.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

Release

Modification

12.2(4)MX

This command was introduced.

12.2(8)YD

This command was incorporated in Cisco IOS Release 12.2(8)YD.

12.2(8)YW

This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Before you configure the **gprs gtp ppp vtemplate** command, you must configure the virtual template interface with the necessary PPP characteristics. The number that you configure for the virtual template interface that defines the PPP characteristics, must correspond to the number that you specify in the **gprs gtp ppp vtemplate** command.

Examples

The following example configures two virtual template interfaces on the GGSN, one for GTP encapsulation and one for PPP, and specifies the PPP virtual template interface for GTP on the GGSN.



Note

The virtual template interface for PPP is a different virtual template interface than the GPRS virtual template interface for GTP encapsulation.

The first section of commands configures the GPRS virtual template interface for GTP:

```
interface Virtual-Template 1
 ip unnumber loopback 1
 no ip directed-broadcast
 encapsulation gtp
 no ip route-cache
```

```
gprs access-point-list gprs
```

The following example configures a virtual template interface for PPP and associates the virtual template for support of the PPP PDP type over GTP on the GGSN:

```
interface Virtual-Template 2
 ip unnumbered FastEthernet 1/0
 no ip directed-broadcast
 no peer default ip address
 ppp authentication chap
 ppp timeout retry 30

gprs gtp ppp vtemplate 2
```

Related Commands

Command	Description
interface virtual-template	Creates a virtual template interface that can be configured and applied dynamically in creating virtual access interfaces.

gprs gtp ppp-regeneration vtemplate

To associate the virtual template interface that is configured for PPP encapsulation with support for regenerated PPP sessions on the GGSN, use the **gprs gtp ppp-regeneration vtemplate** global configuration command. To remove specification of the PPP virtual template interface for regenerated PPP sessions on the GGSN, use the **no** form of this command.

gprs gtp ppp-regeneration vtemplate *number*

no gprs gtp ppp-regeneration vtemplate *number*

Syntax Description

<i>number</i>	Integer identifier of the virtual template interface which defines PPP encapsulation on the GGSN. This number must match the number configured in the corresponding interface virtual-template command.
---------------	--

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Before you configure the **gprs gtp ppp-regeneration vtemplate** command, you must configure the virtual template interface for PPP encapsulation using the **encapsulation ppp** command. In addition, you must also configure the **ip address negotiated** command and the **no peer neighbor-route** command at the virtual template interface for PPP encapsulation.

The number that you configure for the virtual template interface to support PPP encapsulation, must correspond to the number that you specify in the **gprs gtp ppp-regeneration vtemplate** command.

Examples

The following example configures two virtual template interfaces on the GGSN, one for GTP encapsulation for communication between the GGSN and the SGSN, and one for PPP regeneration. The virtual template interface for PPP regeneration supports the creation of PPP sessions from the GGSN over Layer 2 Tunneling Protocol (L2TP) tunnels to an L2TP network server (LNS).



Note

The virtual template interface for PPP regeneration is a different virtual template interface than the GPRS virtual template interface for PPP PDP type support and for GTP encapsulation.

The first section of commands configures the GPRS virtual template interface for GTP:

```
interface Virtual-Template 1
 ip unnumber loopback 1
 no ip directed-broadcast
 encapsulation gtp
 no ip route-cache
 gprs access-point-list gprs
```

The following example configures a virtual template interface for PPP regeneration:

```
interface Virtual-Template 11
 ip address negotiated
 no peer neighbor-route
 encapsulation ppp
```

The following example specifies virtual template interface 11 for PPP regeneration on the GGSN:

```
gprs gtp ppp-regeneration vtemplate 11
```

Related Commands

Command	Description
interface virtual-template	Creates a virtual template interface that can be configured and applied dynamically in creating virtual access interfaces.

gprs gtp response-message wait-accounting

To configure the GGSN to wait for a RADIUS accounting response before sending a create PDP context response to the SGSN, for create PDP context requests received across all access points, use the **gprs gtp response-message wait-accounting** global configuration command. To configure the GGSN to send a create PDP context response to the SGSN after sending a RADIUS start accounting message to the RADIUS server (without waiting for a response from the RADIUS accounting server), use the **no** form of this command.

gprs gtp response-message wait-accounting

no gprs gtp response-message wait-accounting

Syntax Description This command has no arguments or keywords.

Defaults The GGSN sends a create PDP context response to the SGSN after sending a RADIUS start accounting message to the RADIUS accounting server. The GGSN does not wait for a RADIUS accounting response from the RADIUS accounting server.

Command Modes Global configuration

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **gprs gtp response-message wait-accounting** command to configure the GGSN to wait for a RADIUS accounting response from the RADIUS accounting server, before sending a create PDP context response to the SGSN, for create PDP context requests received across all access points.

If the GGSN does not receive a response from the RADIUS accounting server when you have configured the **gprs gtp response-message wait-accounting** command, then the GGSN rejects the PDP context request.

The GGSN supports configuration of RADIUS response message waiting at both the global and access-point configuration levels. You can minimize your configuration by specifying the configuration that you want to support across most APNs, at the global configuration level. Then, at the access-point configuration level, you can selectively modify the behavior that you want to support at a particular APN. Therefore, at the APN configuration level, you can override the global configuration of RADIUS response message waiting.

To configure the GGSN to wait for a RADIUS accounting response as the default behavior for all APNs, use the **gprs gtp response-message wait-accounting** global configuration command. To disable this behavior for a particular APN, use the **no response-message wait-accounting** access-point configuration command.

To verify whether RADIUS response message waiting is enabled or disabled at an APN, you can use the **show gprs access-point** command and observe the value reported in the wait_accounting output field.

Examples

The following example globally configures the GGSN to wait for a RADIUS accounting response from the RADIUS accounting server before sending an activate PDP context response to the SGSN, for PDP context requests received across all access points except access-point 1. RADIUS response message waiting has been overridden at access-point 1 using the **no gtp response-message wait-accounting** command:



Note

This example shows only a partial configuration of the GGSN, to highlight those commands related to implementing RADIUS response message waiting. Additional configuration statements are required to complete a full configuration of the GGSN.

```
aaa new-model
!
aaa group server radius foo
  server 10.2.3.4
  server 10.6.7.8
!
aaa authentication ppp foo group foo
aaa authorization network default group radius
aaa accounting exec default start-stop group foo
!
gprs access-point-list gprs
  access-point 1
    access-mode non-transparent
    access-point-name www.pdn1.com
    aaa-group authentication foo
    no gtp response-message wait-accounting
  exit
  access-point 2
    access-mode non-transparent
    access-point-name www.pdn2.com
    aaa-group authentication foo
!
gprs gtp response-message wait-accounting
!
radius-server host 10.2.3.4 auth-port 1645 acct-port 1646 non-standard
radius-server host 10.6.7.8 auth-port 1645 acct-port 1646 non-standard
radius-server key ggsntel
```

Related Commands

Command	Description
gtp response-message wait-accounting	Configures the GGSN to wait for a RADIUS accounting response before sending a create PDP context response to the SGSN, for create PDP context requests received at a particular APN.
show gprs access-point	Displays information about access points on the GGSN.

gprs gtp t3-response

To specify the initial time that the GGSN waits before resending a signaling request message when a response to a request has not been received, use the **gprs gtp t3-response** global configuration command. To return to the default value, use the **no** form of this command.

gprs gtp t3-response *response-interval*

no gprs gtp t3-response *response-interval*

Syntax Description	<i>response-interval</i> A value between 1 and 65535 that specifies the length of the T3 response interval, in seconds. The default is 1 second.
---------------------------	--

Defaults	1 second
-----------------	----------

Command Modes	Global configuration
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Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines The **gprs gtp t3-response** command is used by the GGSN to process delete PDP context requests and to perform the default method of echo timing.

For delete PDP context requests, the **gprs gtp t3-response** command is used by the GGSN to specify how long the GGSN waits before sending a retry of the delete PDP context request when a response is not received from the SGSN, until the **gprs gtp n3-requests** limit is reached.

The GGSN supports two echo timer implementations—the default echo timer and the dynamic echo timer. The **gprs gtp t3-response** command also is used on the GGSN to perform the default type of echo processing, when the dynamic echo timer is not enabled.

If the GGSN receives the echo response within the path echo interval (as specified in the **gprs gtp path-echo-interval** command; default is 60 seconds), it sends another echo request message after 60 seconds (or whatever time was configured in the **gprs gtp path-echo-interval** command). This message flow continues as long as the GGSN receives an echo response message from the SGSN within the specified path echo interval.

If the GGSN fails to receive an echo response message from the SGSN within the path echo interval, it resends echo request messages until the N3-requests counter is reached (as specified by the **gprs gtp n3-requests** command; default is 5). Because the initial request message is included in the N3-requests counter, the total number of retries is N3-1. The T3 timer increases by a factor of two for each retry (the factor value is not configurable).

For example, if N3 is set to the default of 5, and T3 is set to the default of 1 second, the GGSN will resend 4 echo request messages (the initial request + 4 retries=5). The T3 time increments for each additional echo request, by a factor of 2 seconds. So, the GGSN resends a message in 2 seconds, 4 seconds, 8 seconds, and 16 seconds. If the GGSN fails to receive an echo response message from the SGSN within the time period of the N3-requests counter, it clears the GTP path and deletes all of the PDP contexts.

For the above example, the total elapsed time from when the first request message is sent, to when the GTP path is cleared, is: $60+2+4+8+16=90$ seconds,

where 60 is the initial value of the path echo interval, and the remaining 4 time periods are the increments of the T3 timer for the subsequent retries.

Examples

The following example shows a T3 interval response interval of 524 seconds:

```
gprs gtp t3-response 524
```

Related Commands

Command	Description
gprs gtp n3-requests	Specifies the maximum number of times that the GGSN attempts to send a signaling request to an SGSN.
gprs gtp path-echo-interval	Specifies the number of seconds that the GGSN waits before sending an echo-request message to the SGSN.

gprs idle-pdp-context purge-timer

To specify the time that the GGSN waits before purging idle mobile sessions, use the **gprs idle-pdp-context purge-timer** global configuration command. To return to the default value, use the **no** form of this command.

gprs idle-pdp-context purge-timer *hours*

no gprs idle-pdp-context purge-timer *hours*

Syntax Description	<i>hours</i>	Value between 0 and 255 that specifies the number of hours that the GGSN waits before purging idle sessions. The value 0 disables the purge timer. The default is 72 hours.
---------------------------	--------------	---

Defaults	72 hours
-----------------	----------

Command Modes	Global configuration
----------------------	----------------------

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines	<p>To specify the time that the GGSN waits before purging idle mobile sessions, use the gprs idle-pdp-context purge-timer command. To disable this feature, specify a purge-timer value of 0.</p> <p>You can override the value of the global purge timer using the session idle-time access-point configuration command.</p>
-------------------------	---

Examples	<p>The following example specifies that the GGSN wait for 60 hours before purging idle sessions:</p> <pre>gprs idle-pdp-context purge-timer 60</pre>
-----------------	--

Related Commands	Command	Description
	session idle-time	Specifies the time that the GGSN waits before purging idle mobile sessions for the current access point.

gprs maximum-pdp-context-allowed

To specify the maximum number of PDP contexts (mobile sessions) that can be activated on the GGSN, use the **gprs maximum-pdp-context-allowed** global configuration command. To return to the default value, use the **no** form of this command.

gprs maximum-pdp-context-allowed *pdp-contexts*

no gprs maximum-pdp-context-allowed *pdp-contexts*

Syntax Description	<i>pdp-contexts</i>	Integer between 1 and 4294967295 that specifies the number of active PDP contexts allowed. The default is 10000 PDP contexts.
---------------------------	---------------------	---

Defaults	10000 PDP contexts
-----------------	--------------------

Command Modes	Global configuration
----------------------	----------------------

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX, and the default value was changed from 1000 to 10000.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines	Use the gprs maximum-pdp-context-allowed command to specify the maximum number of PDP contexts allowed on the GGSN. When the maximum allowable number of PDP contexts is reached, the GGSN refuses new PDP contexts (mobile sessions) until sessions are available.
-------------------------	--



Note

The practical upper limit for the maximum number of PDP contexts depends on the router platform that you are using, the amount of memory available on the router, and the type of configuration configured (whether a method of Point to Point Protocol [PPP] has been configured to forward packets beyond the terminal equipment and mobile termination and the rate of PDP context creation to be supported).

If you use DFP with GPRS load balancing, you must also specify a maximum number of PDP contexts for each GGSN, using the **gprs maximum-pdp-context-allowed** command. Do not accept the default value of 10000 PDP contexts. A value of 45000 is recommended. Significantly lower values can impact performance in a GPRS load-balancing environment.

**Note**

For more information about configuring GPRS load balancing, see the *IOS Server Load Balancing*, 12.1(9)E documentation located at Cisco.com at the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121limit/121e/121e9/index.htm>

Examples

In the following example 15000 PDP contexts are allowed on the GGSN:

```
gprs maximum-pdp-context-allowed 15000
```

Related Commands

Command	Description
gprs idle-pdp-context purge-timer	Specifies the time that the GGSN waits before purging idle mobile sessions.

gprs mcc mnc

To configure the mobile country code and mobile network code that the GGSN uses to determine whether a create PDP context request is from a roamer, use the **gprs mcc mnc** global configuration command. To return to the default values, use the **no** form of this command.

```
gprs mcc mcc-num mnc mnc-num
```

```
no gprs mcc mcc-num mnc mnc-num
```

Syntax Description

mcc <i>mcc-num</i>	3-digit decimal number for the mobile country code. The valid ranges for the MCC are 000–999. The default value is 000, which is not a valid code.
mnc <i>mnc-num</i>	2- or 3-digit decimal number for the mobile network code. The valid ranges for the MNC are 00–999. The default value is 000, which is not a valid code.

Defaults

000—For both the MCC and MNC. A valid code must be a non-zero value.

Command Modes

Global configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **gprs mcc mnc** command as part of the configuration required on the GGSN to support creation of CDRs for roaming mobile subscribers, or to block roamers from being able to create PDP context requests.

The GGSN uses the values that you configure in this command to compare with the tunnel ID (TID) in a create PDP context request.

The GGSN automatically specifies values of 000 for the MCC and MNC. However, you must configure non-zero values for both the MCC and MNC before you can enable the GGSN to create charging CDRs for roamers.

To properly issue the **gprs mcc mnc** command, you must specify both the **mcc** keyword with its argument and the **mnc** keyword with its argument. You cannot issue the command without specifying both keywords.

It is important that you configure the **gprs mcc mnc** and **gprs charging roamers** commands in their proper order. After you configure the MCC and MNC values, use the **gprs charging roamers** command to enable charging for roamers on the GGSN. You can change the MCC and MNC values by reissuing the **gprs mcc mnc** command.

To verify your configuration of these codes on the GGSN, use the **show gprs charging parameters** command.

**Note**

To see a list of some established MCC and MNC codes, refer to the “Table of MCC and MNC Codes” section on page 323. To find more information about MCC and MNC codes, see the ITU E.212 recommendation, *Identification Plan for Land Mobile Stations*.

Examples

The following example replaces the default values of 000 on the GGSN, and specifies an MCC code of 310 for the USA and an MNC code of 15 for the Bell South service provider:

```
gprs mcc 310 mnc 15
```

Related Commands

Command	Description
block-foreign-ms	Restricts GPRS access based on the mobile user’s home PLMN.
gprs charging roamers	Enables charging for roamers on the GGSN.
show gprs charging parameters	Displays information about the current GPRS charging configuration.

gprs ms-address exclude-range

To specify the IP address range(s) used by the GPRS network, and thereby excluded from the mobile station (MS) IP address range, use the **gprs ms-address exclude-range** global configuration command. To remove the specified range(s), use the **no** form of this command.

```
gprs ms-address exclude-range start-ip end-ip
```

```
no gprs ms-address exclude-range start-ip end-ip
```

Syntax Description

<i>start-ip</i>	IP address at the beginning of the range.
<i>end-ip</i>	IP address at the end of the range.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

An MS can not have the same IP address as another GPRS network entity. Use the **gprs ms-address exclude-range** command to reserve certain IP address ranges for use by the GPRS network, and to disallow them from use by an MS.

The **gprs ms-address exclude range** command verification is performed only for IP PDPs and does not apply to MS addresses assigned to VPNs or for PPP-Regen or PPP PDP types.

During a create PDP context request, the GGSN verifies whether the IP address of an MS falls within the specified excluded range. If there is an overlap of the MS IP address with an excluded range, then the PDP context request is rejected. This measure prevents duplicate IP addressing in the network.

You can configure up to 100 IP address ranges. A range can be one or more addresses. However, you can configure only one IP address range per command entry. To exclude a single IP address, you can repeat the IP address in the *start-ip* and *end-ip* arguments. IP addresses are 32-bit values.

Examples

Example 1

The following example specifies the IP address ranges used by the GPRS network (which are thereby excluded from the MS IP address range):

```
gprs ms-address exclude-range 10.0.0.1 10.20.40.50
gprs ms-address exclude-range 172.16.150.200 172.30.200.255
gprs ms-address exclude-range 192.168.100.100 192.168.200.255
```

Example 2

The following example excludes an MS from using the IP address of 10.10.10.1:

```
gprs ms-address exclude-range 10.10.10.1 10.10.10.1
```

Related Commands

Command	Description
show gprs ms-address exclude-range	Displays the IP address range(s) configured on the GGSN for the GPRS network.

gprs ni-pdp cache-timeout

To specify the maximum amount of time that the GGSN caches an SGSN address for an MS after an unsuccessful network-initiated PDP context attempt, use the **gprs ni-pdp cache-timeout** global configuration command. To return to the default value, use the **no** form of this command.

gprs ni-pdp cache-timeout *number*

no gprs ni-pdp cache-timeout *number*

Syntax Description	<i>number</i>	Number of seconds from 0 to 65535. The default value is 600 (10 minutes).
---------------------------	---------------	---

Defaults	600 seconds (10 minutes)
-----------------	--------------------------

Command Modes	Global configuration
----------------------	----------------------

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines	The GGSN obtains the SGSN address for an MS from the HLR and caches it for the period of time specified by the gprs ni-pdp cache-timeout command, for unsuccessful network-initiated PDP context attempts with a cause of “MS not reachable” or “MS refuses.” The GGSN needs the SGSN address if the MS is not reachable or if the MS refuses the PDP PDU.
-------------------------	---

Examples	The following example specifies that the GGSN caches the SGSN address for an MS for 300 seconds (5 minutes):
-----------------	--

```
gprs ni-pdp cache-timeout 300
```

Related Commands	Command	Description
	gprs ni-pdp discard-period	Specifies the amount of time that the GGSN discards subsequent PDP PDUs received on the Gi interface for an MS, after an unsuccessful network-initiated PDP context attempt.
	gprs ni-pdp pdp-buffer	Specifies the maximum size of the GGSN buffer to be used for each network-initiated PDP request.
	gprs ni-pdp percentage	Specifies the maximum number of PDP contexts on the GGSN that can be network-initiated, as a percentage of the maximum number of PDP contexts allowed on the GGSN.

gprs ni-pdp discard-period

To specify the amount of time that the GGSN discards subsequent PDP PDUs received on the Gi interface for an MS, after an unsuccessful network-initiated PDP context attempt, use the **gprs ni-pdp discard-period** global configuration command. To return to the default value, use the **no** form of this command.

gprs ni-pdp discard-period *number*

no gprs ni-pdp discard-period *number*

Syntax Description	<i>number</i>	Number of seconds from 0 to 65535. The default value is 300 (5 minutes).
---------------------------	---------------	--

Defaults	300 seconds (5 minutes)
-----------------	-------------------------

Command Modes	Global configuration
----------------------	----------------------

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.	
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.	

Usage Guidelines	Used the gprs ni-pdp discard-period command to specify how long the GGSN discards subsequent PDUs for a PDP context from an MS, after an unsuccessful network-initiated PDP context attempt.
-------------------------	---

Examples	The following example specifies that, after an unsuccessful network-initiated PDP delivery attempt, the GGSN discards subsequent PDP PDUs received on the Gi interface for 180 seconds (3 minutes):
-----------------	---

```
gprs ni-pdp discard-period 180
```

Related Commands	Command	Description
	gprs ni-pdp cache-timeout	Specifies the maximum amount of time that the GGSN caches an SGSN address for an MS, after an unsuccessful network-initiated PDP context attempt.
	gprs ni-pdp pdp-buffer	Specifies the maximum size of the GGSN buffer to be used for each network-initiated PDP request.
	gprs ni-pdp percentage	Specifies the maximum number of PDP contexts on the GGSN that can be network-initiated, as a percentage of the maximum number of PDP contexts allowed on the GGSN.

gprs ni-pdp ip-imsi single

To specify a static IP address to IMSI mapping for a single MS for network-initiated PDP requests from a particular APN, use the **gprs ni-pdp ip-imsi single** global configuration command. To remove the static mapping, use the **no** form of this command.

```
gprs ni-pdp ip-imsi single apn-index ip-address imsi
```

```
no gprs ni-pdp ip-imsi single apn-number ip-address imsi
```

Syntax Description		
<i>apn-index</i>		Integer from 1 to 65535 that identifies a GPRS access point.
<i>ip-address</i>		IP address for the specified IMSI to be used as the PDP address.
<i>imsi</i>		16-digit hexadecimal value of the international mobile subscriber identity for the mobile station.

Defaults No default behavior or values.

Command Modes Global configuration

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines The GGSN supports a single IP address and APN combination for the **gprs ni-pdp ip-imsi single** command. The IMSI must be unique for each IP and APN combination.

You can configure multiple instances of the **gprs ni-pdp ip-imsi single** command.

In addition to configuring the **gprs ni-pdp ip-imsi single** command, you must configure the following other commands to support network-initiated PDP requests on the GGSN:

- **gprs default map-converting-gsn**
- **network-request-activation**



Note

The IMSI digits are packed in the same format as the TID. The second to last hexadecimal digit is overwritten as “F”, resulting in a 15-digit hexadecimal IMSI.

Examples The following example configures a static IP address 10.10.10.10 for a network-initiated PDP request from access point 200 for an MS with an IMSI of 18273645546374.

```
gprs ni-pdp ip-imsi single 200 10.10.10.10 18273645546374
gprs default map-converting-gsn 172.16.10.10
```

```

!
gprs access-point-list abc
  access-point 200
    network-request-activation

```

Note that the **gprs default map-converting-gsn** global configuration command and the **network-request-activation** command at access point 200 are also required to implement the network-initiated PDP support at access point 200.

Related Commands

Command	Description
gprs default map-converting-gsn	Specifies the IP address or host name of the primary (and backup) GSN to communicate with the HLR in sending and receiving MAP messages.
network-request-activation	Enables an access point to support network-initiated PDP requests to a MS.

gprs ni-pdp pdp-buffer

To specify the maximum size of the GGSN buffer to be used for each network-initiated PDP request, use the **gprs ni-pdp pdp-buffer** global configuration command. To return to the default value, use the **no** form of this command.

gprs ni-pdp pdp-buffer *number*

no gprs ni-pdp pdp-buffer *number*

Syntax Description	<i>number</i>	Number of bytes from 0 to 65535. The default is 2000.
---------------------------	---------------	---

Defaults	2000 bytes
-----------------	------------

Command Modes	Global configuration
----------------------	----------------------

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines The GGSN supports three options that together determine the maximum possible memory that the GGSN allocates to buffer any PDU data before a network-initiated PDP request has completed:

- Maximum number of PDP contexts allowed
- Maximum network-initiated PDP percentage
- Maximum buffer size per network-initiated PDP request

Use the following formula to determine the maximum possible memory that the GGSN allocated for buffering of any PDU data for each network-initiated PDP request. The corresponding value for each command should be substituted into the following equation:

(gprs maximum-pdp-context-allowed x gprs ni-pdp percentage / 100) x gprs ni-pdp pdp-buffer

By default, the GGSN allocates the following amount of memory for network-initiated PDP request data buffering: (10000 x 10/100) x 2000 bytes = 2,000,000 bytes.

Use the **gprs maximum-pdp-context-allowed** command to configure the total maximum number of active PDP contexts supported by the GGSN—both mobile-initiated and network-initiated PDP requests combined. The maximum number of PDP contexts supported on the GGSN is router dependent. For more information, see the “Restrictions” section in the “Planning to Configure the GGSN” chapter of the *Cisco IOS Mobile Wireless Configuration Guide*.

The GGSN allocates buffer space as needed and does not preallocate memory. Therefore, it is possible that other functions requiring memory by the GGSN can prevent memory from being available for allocation to the network-initiated PDP requests—even though the buffer has been configured.

In addition, if an entire PDU requiring caching does not fit in the remaining available buffer space, the PDU is discarded.

Examples

The following example configures 3000 bytes as the maximum size of the GGSN buffer to be used for each network-initiated PDP request:

```
gprs ni-pdp pdp-buffer 3000
```

Related Commands

Command	Description
gprs ni-pdp cache-timeout	Specifies the maximum amount of time that the GGSN caches an SGSN address for an MS, after an unsuccessful network-initiated PDP context attempt.
gprs ni-pdp discard-period	Specifies the amount of time that the GGSN discards subsequent PDP PDUs received on the Gi interface for an MS, after an unsuccessful network-initiated PDP context attempt.
gprs ni-pdp percentage	Specifies the maximum number of PDP contexts on the GGSN that can be network-initiated, as a percentage of the maximum number of PDP contexts allowed on the GGSN.

gprs ni-pdp percentage

To specify the maximum number of PDP contexts on the GGSN that can be network-initiated, as a percentage of the maximum number of PDP contexts allowed on the GGSN, use the **gprs ni-pdp percentage** global configuration command. To return to the default value, use the **no** form of this command.

gprs ni-pdp percentage *percentage-number*

no gprs ni-pdp percentage *percentage-number*

Syntax Description	<i>percentage-number</i>	Percentage from 0 to 100 of the total number of PDP contexts that can be network-initiated. The default is 10 percent.
---------------------------	--------------------------	--

Defaults	10 percent
-----------------	------------

Command Modes	Global configuration
----------------------	----------------------

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.	
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.	

Usage Guidelines The GGSN supports three options that together determine the maximum possible memory that the GGSN allocates to buffer any PDU data before a network-initiated PDP request has completed:

- Maximum number of PDP contexts allowed
- Maximum network-initiated PDP percentage
- Maximum buffer size per network-initiated PDP request

Use the following formula to determine the maximum possible memory that the GGSN allocated for buffering of any PDU data for each network-initiated PDP request. The corresponding value for each command should be substituted into the following equation:

(gprs maximum-pdp-context-allowed x gprs ni-pdp percentage / 100) x gprs ni-pdp pdp-buffer

By default, the GGSN allocates the following amount of memory for network-initiated PDP request data buffering: (10000 x 10/100) x 2000 bytes = 2,000,000 bytes.

Use the **gprs maximum-pdp-context-allowed** command to configure the total maximum number of active PDP contexts supported by the GGSN—both mobile-initiated and network-initiated PDP requests combined. The maximum number of PDP contexts supported on the GGSN is router dependent. For more information, see the Restrictions section of the “Planning to Configure the GGSN” chapter in the *Cisco IOS Mobile Wireless Configuration Guide*.

The GGSN allocates buffer space as needed and does not preallocate memory. Therefore, it is possible that other functions requiring memory by the GGSN can prevent memory from being available for allocation to the network-initiated PDP requests—even though the buffer has been configured.

Examples

The following example configures 25 percent as the maximum number of network-initiated PDP requests supported by the GGSN:

```
gprs ni-pdp percentage 25
```

Related Commands

Command	Description
gprs ni-pdp pdp-buffer	Specifies the maximum size (in bytes) of the GGSN buffer to be used for each network-initiated PDP request.
gprs maximum-pdp-context-allowed	Specifies the maximum number of PDP contexts (mobile sessions) that can be activated on the GGSN.

gprs plmn ip address

To specify the IP address range of a PLMN, use the **gprs plmn ip address** global configuration command.

```
gprs plmn ip address start_ip end_ip [sgsn]
```

Syntax Description

<i>start_ip</i>	IP address at the beginning of the range.
<i>end_ip</i>	IP address at the end of the range.
sgsn	(Optional) Specifies that only the PLMN IP address ranges defined with the SGSN keyword specified be used to determine when a SGSN is located in a PLMN other than the GGSN.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

Release	Modification
12.2(8)YW	This command was introduced.

Usage Guidelines

Use the **gprs plmn ip address** global configuration command to specify the IP address range of the PLMN.

When using the **gprs plmn ip address** command with the GGSN charging for roamers feature (**gprs charging roamers** command), the charging for roamer feature functions as follows, depending on how the PLMN IP address ranges have been defined using the **gprs plmn ip address start_ip end_ip [sgsn]** command:

- If no PLMN IP address ranges have been configured using the **gprs plmn ip address start_ip end_ip [sgsn]** command, the GGSN will generate CDRs for all initiated PDP contexts regardless of whether the GGSN and SGSN are located within the same PLMN.
- If a list of PLMN IP address ranges has been configured using the **gprs plmn ip address start_ip end_ip [sgsn]** command, but the **sgsn** keyword has not been specified for any of the ranges, the GGSN will use all the range entries when determining whether the SGSN is located within the same PLMN.

- If a list of PLMN IP address ranges has been configured using the **gprs plmn ip address** *start_ip end_ip* [**sgsn**] command, and one or more of those ranges has been defined using the **sgsn** key word, the GGSN will use those ranges with the **sgsn** keyword specified to determine whether an SGSN is located within the same PLMN.

With this configuration, the following scenarios outline how the charging for roamers feature will function:

- MS1 is subscribed to PLMN1 and attaches to an SGSN in PLMN2. From PLMN2, MS1 initiates a PDP context with the GGSN in PLMN1. In this case, MS1 is a roamer and the GGSN generates a CDR because it determines that the SGSN is located in a different PLMN.
- MS1 is subscribed to PLMN1 and attaches to an SGSN in PLMN2. From PLMN2, MS1 initiates a PDP context with the GGSN in PLMN2. In this case, MS1 is not a roamer because the SGSN and GGSN are in the same PLMN. The GGSN does not create a G-CDR.

Configuration Guidelines

To enable charging for roamers on the GGSN, you should first define a set of IP address ranges for a PLMN using the **gprs plmn ip address** command.

It is important that you configure the **gprs plmn ip address** and **gprs charging roamers** commands in their proper order. After you configure the IP address range for a PLMN, use the **gprs charging roamers** command to enable charging for roamers on the GGSN. You can change the IP address range by reissuing the **gprs plmn ip address** command.

To verify your configuration, use the **show gprs charging parameters** command to see if the charging for roamers command is enabled. To verify your PLMN IP address ranges, use the **show gprs plmn ip address** command.

Examples

The following example specifies the IP address range of a PLMN:

```
gprs plmn ip address 10.0.0.1 10.20.40.50
```

Related Commands

Command	Description
gprs charging roamers	Enables charging for roamers on the GGSN.
show gprs plmn ip address	Displays a list of IP address ranges defined for the PLMN.

gprs qos default-response requested

To specify that the GGSN sets its default QoS values in the response message exactly as requested in the create PDP context request message, use the **gprs qos default-response requested** global configuration command. To return to the default QoS, use the **no** form of this command.

gprs qos default-response requested

no gprs qos default-response requested

Syntax Description This command has no arguments or keywords.

Defaults Disabled. The GGSN sets its QoS default to the best-effort class.

Command Modes Global configuration

Command History	Release	Modification
	12.2(2)	This command was introduced.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines The **gprs qos default-response requested** command is only useful when canonical QoS is not configured on the GGSN. Canonical QoS is enabled using the **gprs qos map canonical-qos** command. When canonical QoS is not enabled, and the **gprs qos default-response requested** command has not been configured on the GGSN, the GGSN always sets its QoS values to best-effort in the response message.

Examples The following example enables the GGSN to set its QoS values in the response message according to the QoS values requested in the create PDP context request message:

```
gprs qos default-response requested
```

Related Commands	Command	Description
	gprs qos map canonical-qos	Enables mapping of GPRS QoS categories to a canonical QoS method that includes best-effort, normal, and premium QoS classes.

gprs qos map canonical-qos

To enable mapping of GPRS QoS categories to a canonical QoS method that includes best-effort, normal, and premium QoS classes, use the **gprs qos map canonical-qos** global configuration command. To disable canonical mapping, use the **no** form of this command.

gprs qos map canonical-qos

no gprs qos map canonical-qos

Syntax Description This command has no arguments or keywords.

Defaults Canonical QoS mapping is disabled.

Command Modes Global configuration

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **gprs qos map canonical-qos** command to map GPRS QoS into the following canonical categories: best effort, normal, and premium.

Examples

The following example shows canonical QoS mapping enabled:

```
gprs qos map canonical-qos
```

Related Commands

Command	Description
gprs canonical-qos best-effort bandwidth-factor	Specifies the bandwidth factor to be applied to the canonical best-effort QoS class.
gprs canonical-qos gsn-resource-factor	Specifies a value that is used by the GGSN to calculate the QoS level provided to mobile users.

Command	Description
gprs canonical-qos map tos	Specifies a QoS mapping from the canonical QoS classes to an IP ToS category.
gprs canonical-qos premium mean-throughput-deviation	Specifies a mean throughput deviation factor that the GGSN uses to calculate the allowable data throughput for QoS.

gprs qos map delay

To enable mapping of GPRS QoS categories to delay QoS classes, use the **gprs qos map delay** global configuration command. To disable delay mapping, use the **no** form of this command.

gprs qos map delay

no gprs qos map delay

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Global configuration

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **gprs qos map delay** command to enable QoS delay mapping on the GGSN. To map the QoS delay classes (class 1, class 2, class 3, and best effort) to IP type of service (ToS) categories, use the **gprs delay-qos map tos** command.

Examples The following example enables delay QoS mapping:

```
gprs qos map delay
```

Related Commands	Command	Description
	gprs delay-qos map tos	Specifies a QoS mapping from the delay QoS classes to an IP type of service (ToS) category.
	gprs qos default-response requested	Configures the GGSN to set its default QoS mapping values in a create PDP response message which has no QoS mapping selected.

gprs qos map umts

To enable UMTS QoS on the GGSN, use the **gprs qos map umts** global configuration command. To disable this mapping and return to the default QoS mapping, use the **no** form of this command.

gprs qos map umts

no gprs qos map umts

Syntax Description This command has no arguments or keywords.

Defaults UMTS QoS mapping is disabled.

Command Modes Global configuration

Command History	Release	Modification
	12.2(8)YW	This command was introduced.

Usage Guidelines Use the **gprs qos map umts** command to enable UMTS QoS mapping.

Examples The following example enables UMTS traffic QoS mapping:

```
gprs qos map umts
```

Related Commands	Command	Description
	gprs umts-qos map traffic-class	Specifies a QoS mapping from the UMTS traffic classes to a differentiated services (DiffServ) per-hop behavior (PHB) group.
	gprs umts-qos map diffserv-phb	Assigns a differentiated services code point (DSCP) to a DiffServ PHB group.
	gprs umts-qos dscp unmodified	Specifies that the subscriber datagram be forwarded through the GTP path without modifying its DSCP.
	show gprs qos status	Displays QoS statistics for the GGSN.
	show gprs umts-qos map traffic-class	Displays UMTS QoS mapping information.

gprs radius msisdn first-byte

To specify that the first byte of the Mobile Stations International PSTN/ISDN (MSISDN) information element (IE) is included in a Remote Access Dial-In User Service (RADIUS) request, use the **gprs radius msisdn first-byte** global configuration command. To remove the first byte from the MSISDN IE in a RADIUS request, use the **no** form of this command.

gprs radius msisdn first-byte

no gprs radius msisdn first-byte

Syntax Description This command has no arguments or keywords.

Defaults The first byte is not included.

Command Modes Global configuration

Command History

Release	Modification
12.2(1)	This command was introduced.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **gprs radius msisdn first-byte** command when configuring RADIUS security on the GGSN. The first octet of an MSISDN IE using E.164 addressing is 91 in hexadecimal, that is 10010001. In this 91 code, the 1 is the extension bit, 001 is the international number, and 0001 indicates E.164 numbering.

Examples

The following example specifies that the first byte of the MSISDN IE is included in a RADIUS request:

```
gprs radius msisdn first-byte
```

gprs slb cef

To identify the IP address of the GGSN virtual server to CEF, use the **gprs slb cef** global configuration command. To remove the IP address identification, use the **no** form of this command.

gprs slb cef *virtual-server-address*

no gprs slb cef *virtual-server-address*

Syntax Description	<i>virtual-server-address</i>	IP address of the GGSN virtual server instance used by clients to connect to the server farm. (This virtual IP address is also a loopback address on the GGSN.)
---------------------------	-------------------------------	---

Defaults	No default behavior or values.
-----------------	--------------------------------

Command Modes	Global configuration
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Command History	Release	Modification
	12.1(9)E	This command was introduced.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines	This command is required if the GGSN is using CEF switching. If the GGSN is <i>not</i> using CEF switching, do not use this command.
-------------------------	--



Note

For more information about configuring GPRS load balancing, see the *IOS Server Load Balancing*, 12.1(9)E documentation located at Cisco.com at the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121limit/121e/121e9/index.htm>

Examples	The following example identifies the IP address of the GGSN virtual server, 10.0.0.13, to CEF:
-----------------	--

```
gprs slb cef 10.0.0.13
```

Related Commands

Command	Description
interface loopback	Creates a loopback interface.
ip cef	Enables CEF on the RP card.
virtual (virtual server)	Configures the virtual server attributes.

gprs umts-qos dscp unmodified

To specify that the subscriber datagram be forwarded through the GTP path without modifying its DSCP, use the **gprs umts-qos dscp unmodified** global configuration command. To remove this specification and enable the DSCP to be re-marked with the DSCP assigned to the traffic class during the PDP context creation, use the **no** form of this command.

```
gprs umts-qos dscp unmodified [up | down | all]
```

```
no gprs umts-qos dscp unmodified [up | down | all]
```

Syntax Description	up	(Optional) Specifies subscriber datagram DSCPs in the uplink GTP path.
	down	(Optional) Specifies subscriber datagram DSCPs in the downlink GTP path.
	all	(Optional) Specifies subscriber datagram DSCPs in all GTP paths.

Defaults The DSCP in the subscriber datagram is re-marked with the DSCP assigned to the traffic class during the PDP context creation.

Command Modes Global configuration

Command History	Release	Modification
	12.2(8)YW	This command was introduced.

Usage Guidelines Use the **gprs umts-qos dscp unmodified** command to configure the GGSN to forward subscriber datagram DSCPs through the GTP path without modifying the DSCP.

Examples The following example sets subscriber datagrams in the uplink GTP path to retain their DSCPs:

```
gprs umts-qos dscp unmodified up
```

Related Commands	Command	Description
	gprs qos map umts	Enables UMTS QoS on the GGSN.
	gprs umts-qos map traffic-class	Specifies a QoS mapping from the UMTS traffic classes to a differentiated services (DiffServ) per-hop behavior (PHB) group.
	gprs umts-qos map diffserv-phb	Assigns a differentiated services code point (DSCP) to a DiffServ PHB group.
	show gprs qos status	Displays QoS statistics for the GGSN.
	show gprs umts-qos map traffic-class	Displays UMTS QoS mapping information.

gprs umts-qos map diffserv-phb

To assign a differentiated services code point (DSCP) to a DiffServ PHB group, use the **gprs umts-qos map diffserv-phb** global configuration command. To set the specified DSCP to the default DiffServ PHB group, use the **no** form of this command.

```
gprs umts-qos map diffserv-phb diffserv-phb-group [dscp1] [dscp2] [dscp3]
```

```
no gprs umts-qos map diffserv-phb diffserv-phb-group [dscp1] [dscp2] [dscp3]
```

Syntax Description

<i>diffserv-phb-group</i>	Specifies the DiffServ PHB group. The PHB groups are: <ul style="list-style-type: none"> • signalling-class • ef-class • af1-class • af2-class • af3-class • af4-class • best-effort
<i>dscp1</i>	Required for all classes. Specifies one of 64 DSCP values from 0 to 63. The DSCP value corresponds to drop precedence 1.
<i>dscp2</i>	(Optional for AF classes only) Specifies one of 64 DSCP values from 0 to 63. The DSCP value corresponds to drop precedence 2.
<i>dscp3</i>	(Optional for AF classes only) Specifies one of 64 DSCP values from 0 to 63. The DSCP value corresponds to drop precedence 3.

Defaults

The default DSCP value associated with the PHB class is used.

Command Modes

Global configuration

Command History

Release	Modification
12.2(8)YW	This command was introduced.

Usage Guidelines

For the Assured Forwarding (AF) PHB group, you can specify up to three DSCP values for each drop precedence. The signalling, EF, and best-effort classes do not have drop precedence, so only the first DSCP value is used. If you enter a value for the *dscp2* or *dscp3* arguments for these classes, it is ignored.

Drop precedence indicates the order in which a packet will be dropped when there is congestion on the network.

Table 3 shows the default DSCP values for each PHB group.

Table 3 Default DSCP Values per PHB Group

PHB	DSCP
Signalling	5?
EF	101110 (46)
AF11	001010 (10)
AF12	001100 (12)
AF13	001110 (14)
AF21	010010 (18)
AF22	010100 (20)
AF23	010110 (22)
AF31	011010 (26)
AF32	011100 (28)
AF33	011110 (30)
AF41	100010 (34)
AF42	100100 (36)
AF43	100110 (38)
Best effort	000000 (0)

Examples

The following example assigns a DSCP value of 31 to the EF class and three DSCP values to AF class2 of 51, 52, and 53:

```
gprs umts-qos map diffserv-phb ef-class 31
gprs umts-qos map diffserv-phb af-class2 51 52 53
```

Related Commands

Command	Description
gprs qos map umts	Enables UMTS QoS on the GGSN.
gprs umts-qos map traffic-class	Specifies a QoS mapping from the UMTS traffic classes to a differentiated services (DiffServ) per-hop behavior (PHB) group.
gprs umts-qos dscp unmodified	Specifies that the subscriber datagram be forwarded through the GTP path without modifying its DSCP.
show gprs qos status	Displays QoS statistics for the GGSN.
show gprs umts-qos map traffic-class	Displays UMTS QoS mapping information.
class-map	Creates a class map to be used for matching packets to a specified class.
match protocol	Configures the match criteria for a class map on the basis of the specified protocol.

gprs umts-qos map traffic-class

To specify a QoS mapping from the UMTS traffic classes to a differentiated services (DiffServ) per-hop behavior (PHB) group, use the **gprs umts-qos map traffic-class** global configuration command. To remove a QoS mapping and set the specified traffic class to the default mapping, use the **no** form of this command.

```
gprs umts-qos map traffic-class traffic-class diffserv-phb-group
```

```
no gprs umts-qos map traffic-class traffic-class diffserv-phb-group
```

Syntax Description

<i>traffic-class</i>	Specifies the traffic class. The UMTS traffic classes are: <ul style="list-style-type: none"> • signalling • conversational • streaming • interactive • background
<i>diffserv-phb-group</i>	Specifies the DiffServ PHB group. The PHB groups are: <ul style="list-style-type: none"> • signalling-class • ef-class • af1-class • af2-class • af3-class • af4-class • best-effort

Defaults

You must enable UMTS QoS using the **gprs qos map umts** command before entering this command.



Note

Use the **gprs umts-qos map traffic-class** command only if you want to use mapping values other than the defaults.

The default mapping values for the UMTS traffic classes are as follows:

- signalling traffic class to the signalling-class DiffServ PHB group
- conversational traffic class to the ef-class DiffServ PHB group
- streaming traffic class to the af2-class DiffServ PHB group
- interactive traffic class to the af3-class DiffServ PHB group
- background traffic class to the best-effort DiffServ PHB group

Command Modes

Global configuration

Command History

Release	Modification
12.2(8)YW	This command was introduced.

Usage Guidelines

Use the **gprs umts-qos map traffic-class** command to specify a mapping between various QoS UMTS traffic categories and the DiffServ PHB groups.

Examples

The following example specifies a QoS mapping from the UMTS traffic class conversational to the DiffServ PHB group af-class1:

```
gprs umts-qos map traffic-class conversational af1-class
```

Related Commands

Command	Description
gprs qos map umts	Enables UMTS QoS on the GGSN.
gprs umts-qos map diffserv-phb	Assigns a differentiated services code point (DSCP) to a DiffServ PHB group.
gprs umts-qos dscp unmodified	Specifies that the subscriber datagram be forwarded through the GTP path without modifying its DSCP.
show gprs qos status	Displays QoS statistics for the GGSN.
show gprs umts-qos map traffic-class	Displays UMTS QoS mapping information.

gtp response-message wait-accounting

To configure the GGSN to wait for a RADIUS accounting response before sending a create PDP context response to the SGSN, for create PDP context requests received at a particular APN, use the **gtp response-message wait-accounting** access-point configuration command. To configure the GGSN to send a create PDP context response to the SGSN after sending a RADIUS start accounting message to the RADIUS server (without waiting for a response from the RADIUS accounting server), use the **no** form of this command.

gtp response-message wait-accounting

no gtp response-message wait-accounting

Syntax Description This command has no arguments or keywords.

Defaults The GGSN sends a create PDP context response to the SGSN after sending a RADIUS start accounting message to the RADIUS accounting server. The GGSN does not wait for a RADIUS accounting response from the RADIUS accounting server.

Command Modes Access-point configuration

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **gtp response-message wait-accounting** command to configure the GGSN to wait for a RADIUS accounting response from the RADIUS accounting server, before sending a create PDP context response to the SGSN.

If the GGSN does not receive a response from the RADIUS accounting server when you have configured the **gtp response-message wait-accounting** command, then the GGSN rejects the PDP context request.

The GGSN supports configuration of RADIUS response message waiting at both the global and access-point configuration levels. You can minimize your configuration by specifying the configuration that you want to support across most APNs, at the global configuration level. Then, at the access-point configuration level, you can selectively modify the behavior that you want to support at a particular APN. Therefore, at the APN configuration level, you can override the global configuration of RADIUS response message waiting.

To configure the GGSN to wait for a RADIUS accounting response as the default behavior for all APNs, use the **gprs gtp response-message wait-accounting** global configuration command. To disable this behavior for a particular APN, use the **no gtp response-message wait-accounting** access-point configuration command.

To verify whether RADIUS response message waiting is enabled or disabled at an APN, you can use the **show gprs access-point** command and observe the value reported in the wait_accounting output field.

Examples

The following examples show only a partial configuration of the GGSN, to highlight those commands related to implementing RADIUS response message waiting. Additional configuration statements are required to complete a full configuration of the GGSN.

Example 1

The following example configures the GGSN to wait for an accounting response from the RADIUS server before sending a create PDP context response to the SGSN, for PDP context requests at access-point 1:

```
aaa new-model
!
aaa group server radius foo
  server 10.2.3.4
  server 10.6.7.8
!
aaa authentication ppp foo group foo
aaa authorization network default group radius
aaa accounting exec default start-stop group foo
!
gprs access-point-list gprs
  access-point 1
    access-mode non-transparent
    access-point-name www.pdn1.com
    aaa-group authentication foo
    gtp response-message wait-accounting
!
radius-server host 10.2.3.4 auth-port 1645 acct-port 1646 non-standard
radius-server host 10.6.7.8 auth-port 1645 acct-port 1646 non-standard
radius-server key ggsntel
```

Example 2

The following example globally configures the GGSN to wait for a RADIUS accounting response from the RADIUS server before sending a create PDP context response to the SGSN. The GGSN waits for a response for PDP context requests received across all access points, except access-point 1. RADIUS response message waiting has been overridden at access-point 1 using the **no gtp response-message wait-accounting** command:

```
aaa new-model
!
aaa group server radius foo
  server 10.2.3.4
  server 10.6.7.8
!
aaa authentication ppp foo group foo
aaa authorization network default group radius
aaa accounting exec default start-stop group foo
!
gprs access-point-list gprs
  access-point 1
    access-mode non-transparent
    access-point-name www.pdn1.com
    aaa-group authentication foo
    no gtp response-message wait-accounting
    exit
  access-point 2
    access-mode non-transparent
    access-point-name www.pdn2.com
    aaa-group authentication foo
!
gprs gtp response-message wait-accounting
!
```

```
radius-server host 10.2.3.4 auth-port 1645 acct-port 1646 non-standard
radius-server host 10.6.7.8 auth-port 1645 acct-port 1646 non-standard
radius-server key ggsntel
```

Related Commands

Command	Description
gprs gtp response-message wait-accounting	Configures the GGSN to wait for a RADIUS accounting response before sending an activate PDP context request to the SGSN, for create PDP context requests received across all access points.
show gprs access-point	Displays information about access points on the GGSN.

ip-access-group

To specify access permissions between an MS and a PDN through the GGSN at a particular access point, use the **ip-access-group** access-point configuration command. To disable the input access list, use the **no** form of this command.

```
ip-access-group access-list-number {in | out}
```

```
no ip-access-group access-list-number {in | out}
```

Syntax Description	Description
<i>access-list-number</i>	Number of an access list that has been set up using the access-list command.
in	The specified access list controls access from the PDN to the mobile station.
out	The specified access list controls access from the mobile station to the PDN.

Defaults No access list is enforced.

Command Modes Access-point configuration

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **ip-access-group** command to specify an access list that indicates whether users are given or denied permission to access the mobile station from the PDN through the GGSN using a specified access point.

Examples

The following example grants access-list 101 inbound access to the mobile station from the PDN through the GGSN:

```
access-list 101 permit ip 10.0.0.2 0.255.255.255 any
interface virtual-template 1
  ip unnumber loopback 1
  no ip directed-broadcast
  encapsulation gtp
  gprs access-point-list abc
!
gprs access-point-list abc
access-point 1
  access-point-name gprs.somewhere.com
  dhcp-server 10.100.0.3
  ip-access-group 101 in
  exit
!
```

ip-address-pool

To specify a dynamic address allocation method using IP address pools for the current access point, use the **ip-address-pool** access-point configuration command. To return to the default value, use the **no** form of this command.

```
ip-address-pool { dhcp-proxy-client | radius-client | disable }
```

```
no ip-address-pool { dhcp-proxy-client | radius-client | disable }
```

Syntax Description

dhcp-proxy-client	The access-point IP address pool is allocated using a DHCP server.
radius-client	The access-point IP address pool is allocated using a RADIUS server.
disable	Disables dynamic address allocation for this access point.

Defaults

The global setting specified with the **gprs default ip-address-pool** command is used. The default value for the global configuration command is that IP address pools are disabled.

Command Modes

Access-point configuration

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

You can specify an IP allocation method for an access point in two ways:

- Enter access-point configuration mode and use the **ip-address-pool** command to specify an IP address allocation method for the current access point.
- Specify a global value for the IP address pool by issuing the **gprs default ip-address-pool** command. In that case, you do not need to specify an address-pool method for the specific access point.

If you specify **dhcp-proxy-client** as the method for allocating IP addresses, then you must configure a DHCP server for IP address allocation. You can do this at the global configuration level using the **gprs default-dhcp server** command, or at the access point level using the **dhcp-server** command.

If you specify **radius-client** as the method for allocating IP addresses, then you must configure a RADIUS server for IP address allocation, configure AAA on the GGSN, and configure AAA server groups globally on the GGSN or at the access point. For more information about configuring RADIUS on the GGSN, refer to the Usage Guidelines section for the **aaa-group** and **gprs default aaa-group** commands.

Examples

The following example configures DHCP as the IP address pool allocation method for access-point 1 and specifies that the other access points use the global default, which is specified as RADIUS:

```

aaa new-model
!
aaa group server radius foo
  server 10.2.3.4
  server 10.6.7.8
aaa group server radius foo1
  server 10.10.0.1
!
aaa authentication ppp foo group foo
aaa authentication ppp foo group foo1
aaa authorization network default group radius
aaa accounting exec default start-stop group foo
aaa accounting network foo1 start-stop group foo1
!
interface Loopback0
  ip address 10.88.0.1 255.255.255.255
!
interface virtual-template 1
  ip unnumber Loopback0
  no ip directed-broadcast
  encapsulation gtp
  gprs access-point-list abc
!
gprs access-point-list abc
  access-point 1
    access-point-name gprs.pdn1.com
    ip address-pool dhcp-proxy-client
    aggregate auto
    dhcp-server 10.100.0.3
    dhcp-gateway-address 10.88.0.1
    exit
!
  access-point 2
    access-point-name gprs.pdn2.com
    access-mode non-transparent
    aaa-group authentication foo
    exit
!
gprs default ip-address-pool radius-client
!
radius-server host 10.2.3.4 auth-port 1645 acct-port 1646 non-standard
radius-server host 10.6.7.8 auth-port 1645 acct-port 1646 non-standard
radius-server host 10.10.0.1 auth-port 1645 acct-port 1646 non-standard
radius-server key ggsntel

```

Related Commands

Command	Description
dhcp-server	Specifies a primary (and backup) DHCP server to allocate IP addresses to MS users entering a particular PDN access point.
gprs default dhcp-server	Specifies a default DHCP server from which the GGSN obtains IP address leases for mobile users.
gprs default ip-address-pool	Specifies a dynamic address allocation method using IP address pools for the GGSN.

Command	Description
aaa-group	Specifies a AAA server group and assigns the type of AAA services to be supported by the server group for a particular access point on the GGSN.
gprs default aaa-group	Specifies a default AAA server group and assigns the type of AAA services to be supported by the server group for all access points on the GGSN

msisdn suppression

To specify that the GGSN overrides the mobile station integrated services digital network (MSISDN) number with a pre-configured value in its authentication requests to a RADIUS server, use the **msisdn suppression** access point configuration command. To enable the GGSN to send the MSISDN number in authentication requests to a RADIUS server, use the **no** form of the command.

msisdn suppression [*value*]

no msisdn suppression [*value*]

Syntax Description

<i>value</i>	(Optional) String (up to 20 characters long) that the GGSN sends in place of the MSISDN number in authentication requests to a RADIUS server. Valid characters for the string are any of those accepted by the MSISDN encoding specifications, including the integers 0–9, and characters a, b, c, * and #. The default value is that no string is sent.
--------------	--

Defaults

The MSISDN number is suppressed, and no ID string is sent to the RADIUS server in place of the MSISDN number.

Command Modes

Access point configuration

Command History

Release	Modification
12.2(2)	This command was introduced.
12.2(4)MX2	This command was incorporated in Cisco IOS Release 12.2(4)MX2.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Certain countries have privacy laws which prohibit service providers from identifying the MSISDN number of mobile stations in authentication requests. Use the **msisdn suppression** command to specify a value that the GGSN sends in place of the MSISDN number in its authentication requests to a RADIUS server. If no value is configured, then no number is sent to the RADIUS server.

To use the **msisdn suppression** command, you must configure a RADIUS server either globally or at the access point and specify non-transparent access mode.

Examples

The following example will override the MSISDN ID sent in the create request and will not send any ID to the RADIUS server:

```
gprs access-point-list abc
  access-point 1
    radius-server 192.168.1.1
    access-mode non-transparent
    msisdn suppression
```

Related Commands

Command	Description
access-mode	Specifies whether the GGSN requests user authentication at the access point to a PDN.
aaa-group	Specifies a AAA server group and assigns the type of AAA services to be supported by the server group for a particular access point on the GGSN.
gprs default aaa-group	Specifies a default AAA server group and assigns the type of AAA services to be supported by the server group for all access points on the GGSN.

network-request-activation

To enable an access point to support network-initiated PDP requests, use the **network-request-activation** access-point configuration command. To disable support for network-initiated PDP requests at an access point, use the **no** form of this command.

network-request-activation

no network-request-activation

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values.

Command Modes Access-point configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

In addition to configuring the **network-request-activation** command, you must configure the following other commands to support network-initiated PDP requests on the GGSN:

- **gprs ni-pdp ip-imsi single**
- **gprs default map-converting-gsn**

Examples

The following example shows how to enable support for network-initiated PDP requests at access point 200:

```
gprs access-point-list abc
 access-point 200
 network-request-activation
```

Related Commands

Command	Description
gprs ni-pdp ip-imsi single	Specifies a static IP address to IMSI mapping for a single MS for network-initiated PDP requests from a particular APN.
gprs default map-converting-gsn	Specifies the address or host name of the SGSN that sends Mobile Application Protocol (MAP) messages to and from the home location register (HLR).

ppp-regeneration

To enable an access point to support PPP regeneration, use the **ppp-regeneration** access-point configuration command. To disable support for PPP regeneration at an access point, use the **no** form of this command.

ppp-regeneration [**max-session** *number*] [**setup-time** *seconds*]

no ppp-regeneration [**max-session** *number*] [**setup-time** *seconds*]

Syntax Description

max-session <i>number</i>	Maximum number of PPP regenerated sessions allowed at the access point. The default value 65535.
setup-time <i>seconds</i>	Maximum amount of time (between 1 and 65535 seconds) within which a PPP regenerated session must be established. The default value is 60 seconds.

Defaults

The default **max-session** value is 65535.

The default **setup-time** is 60 seconds.

Command Modes

Access-point configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD and the default value changed from being device dependent to 65535.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **ppp-regeneration** command to enable an access point to support PPP regeneration and to specify parameters for PPP regeneration sessions on the GGSN.



Note

PPP regeneration support at an access point requires CEF to be enabled on the RP using the **ip cef** command.

The maximum **setup-time** value should allow for the total amount of time required to create the PPP virtual access (VA) and to establish a PPP session. If the setup-time is reached before the PPP IP Control Protocol (IPCP) is up, the GGSN tears down the L2TP session, PPP VA, and PDP context.

The method of PPP configured to forward packets beyond the terminal equipment and mobile termination affects the maximum number of PDP contexts supported on the GGSN. For more information, see the “Configuring PPP Support on the GGSN” chapter of the Cisco IOS Mobile Wireless Configuration Guide for Cisco IOS Release 12.2(8)YD.

Examples

The following example shows a partial GGSN configuration for PPP regeneration, where PPP regeneration is enabled at access point 1. It specifies a maximum of 100 PPP regeneration sessions, with a limit of 30 seconds to create the PPP VA and establish a PPP session:

```
gprs access-point-list abc
  access-point 1
    access-point-name gprs.corporate.com
    ppp-regeneration max-session 100 setup-time 30
  exit
```

Related Commands

Command	Description
gprs gtp ppp-regeneration vtemplate	Associates the virtual template interface that is configured for PPP encapsulation with support for regenerated PPP sessions on the GGSN.
interface virtual-template	Creates a virtual template interface that can be configured and applied dynamically in creating virtual access interfaces.

radius attribute suppress imsi

To specify that the GGSN suppress the Third Generation Partnership Project (3GPP) vendor-specific attribute (VSA) 3GPP-IMSI number in its authentication and accounting requests to a RADIUS server, use the **radius attribute suppress imsi** access point configuration command. To enable the GGSN to send the 3GPP VSA 3GPP-IMSI number in authentication and accounting requests to a RADIUS server, use the **no** form of the command.

radius attribute suppress imsi

no radius attribute suppress imsi

Syntax Description This command has no arguments or keywords.

Defaults The default is to send the 3GPP VSA 3GPP-IMSI number in authentication and accounting requests to a RADIUS server.

Command Modes Access point configuration

Command History	Release	Modification
	12.2(8)YD	This command was introduced.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **radius attribute suppress imsi** command to have GGSN suppress the 3GPP VSA 3GPP-IMSI number in its authentication and accounting requests to a RADIUS server.

Examples The following example will not send the 3GPP VSA 3GPP-IMSI to the RADIUS server:

```
gprs access-point-list abc
  access-point 1
    radius attribute suppress imsi
```

Related Commands	Command	Description
	access-mode	Specifies whether the GGSN requests user authentication at the access point to a PDN.
	aaa-group	Specifies a AAA server group and assigns the type of AAA services to be supported by the server group for a particular access point on the GGSN.
	gprs default aaa-group	Specifies a default AAA server group and assigns the type of AAA services to be supported by the server group for all access points on the GGSN.
	show gprs access-point	Displays information about access points on the GGSN.

radius attribute suppress qos

To specify that the GGSN suppress the 3GPP VSA 3GPP-GPRS-QoS-Profile in its authentication and accounting requests to a RADIUS server, use the **radius attribute suppress qos** access point configuration command. To enable the GGSN to send the 3GPP VSA 3GPP-GPRS-QoS-Profile in authentication and accounting requests to a RADIUS server, use the **no** form of the command.

radius attribute suppress qos

no radius attribute suppress qos

Syntax Description This command has no arguments or keywords.

Defaults The default is to send the 3GPP VSA 3GPP-GPRS-QoS-Profile in authentication and accounting requests to a RADIUS server.

Command Modes Access point configuration

Command History	Release	Modification
	12.2(8)B	This command was introduced.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **radius attribute suppress qos** command to have GGSN suppress the 3GPP VSA 3GPP-GPRS-QoS-Profile in its authentication and accounting requests to a RADIUS server.

Examples The following example will not send the 3GPP VSA 3GPP-GPRS-QoS-Profile to the RADIUS server:

```
gprs access-point-list abc
  access-point 1
    radius attribute suppress qos
```

Related Commands	Command	Description
	access-mode	Specifies whether the GGSN requests user authentication at the access point to a PDN.
	aaa-group	Specifies a AAA server group and assigns the type of AAA services to be supported by the server group for a particular access point on the GGSN.
	gprs default aaa-group	Specifies a default AAA server group and assigns the type of AAA services to be supported by the server group for all access points on the GGSN.
	show gprs access-point	Displays information about access points on the GGSN.

radius attribute suppress sgsn-address

To specify that the GGSN suppress the 3GPP VSA 3GPP-SGSN-Address in its authentication and accounting requests to a RADIUS server, use the **radius attribute suppress sgsn-address** access point configuration command. To enable the GGSN to send the 3GPP VSA 3GPP-SGSN-Address in authentication and accounting requests to a RADIUS server, use the **no** form of the command.

radius attribute suppress sgsn-address

no radius attribute suppress sgsn-address

Syntax Description This command has no arguments or keywords.

Defaults The default is to send the 3GPP VSA 3GPP-SGSN-Address in authentication and accounting requests to a RADIUS server.

Command Modes Access point configuration

Command History	Release	Modification
	12.2(8)B	This command was introduced.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **radius attribute suppress sgsn-address** command to have GGSN suppress the 3GPP VSA 3GPP-SGSN-Address in its authentication and accounting requests to a RADIUS server.

Examples The following example will not send the 3GPP VSA 3GPP-SGSN-Address to the RADIUS server:

```
gprs access-point-list abc
  access-point 1
    radius attribute suppress sgsn-address
```

Related Commands	Command	Description
	access-mode	Specifies whether the GGSN requests user authentication at the access point to a PDN.
	aaa-group	Specifies a AAA server group and assigns the type of AAA services to be supported by the server group for a particular access point on the GGSN.
	gprs default aaa-group	Specifies a default AAA server group and assigns the type of AAA services to be supported by the server group for all access points on the GGSN.
	show gprs access-point	Displays information about access points on the GGSN.

redirect intermobile ip

To redirect mobile-to-mobile traffic to an external device, use the **redirect intermobile ip** access-point configuration command. To disable the redirection of mobile-to-mobile traffic, use the **no** form of this command.

redirect intermobile ip *ip-address*

no redirect intermobile ip *ip-address*

Syntax Description	<i>ip-address</i>	IP address of the external device to which you want to redirect mobile-to-mobile traffic.
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Defaults	Disabled	
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Command Modes	Access-point configuration	
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Command History	Release	Modification
	12.2(8)B	This command was introduced.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.	

Usage Guidelines

Use the **redirect intermobile ip** access-point command to redirect mobile-to-mobile traffic to an external device (such as an external firewall) for verification.

Redirection of intermobile traffic does not occur on an ingress APN unless the TPDU's are exiting the same APN. In addition, redirection of TPDU's tunneled by L2TP from the ingress APN to the LNS of the PDN does not occur.

Examples

The following example redirects mobile-to-mobile traffic to 5.5.5.13:

```
redirect intermobile ip 5.5.5.13
```

Related Commands	Command	Description
		gprs plmn ip address
	security verify	Specifies the verification of source and/or destination addresses.

security verify

To enable the GGSN to verify the IP verification of IP addresses in TPDU's, use the **security verify** access-point configuration command. To disable the verification of IP addresses, use the **no** form of this command.

security verify {source | destination}

no security verify {source | destination}

Syntax Description	source	destination
	Specifies that the source IP address of an upstream TPDU be verified against the address previously assigned an MS.	Specifies that the destination address of upstream TPDU received off a GTP tunnel be verified against the global list of PLMN addresses specified by the gprs plmn ip address global configuration command.

Defaults Disabled

Command Modes Access-point configuration

Command History	Release	Modification
	12.2(8)B	This command was introduced.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **security verify source** access point configuration command to configure the GGSN to verify the source IP address of an upstream TPDU against the address previously assigned to an MS.

When the **security verify source** command is configured on an APN, the GGSN verifies the source address of a TPDU before GTP will accept and forward it. If the GGSN determines that the address differs from that previously assigned to the MS, it drops the TPDU and accounts it as an illegal packet in its PDP context and APN. Configuring the **security verify source access point** configuration command protects the GGSN from faked user identities.

Use the **security verify destination** access point configuration command to have the GGSN verify the destination addresses of upstream TPDU's against global lists of PLMN addresses specified using the **gprs plmn ip address** command. If the GGSN determines that a destination address of a TPDU is within the range of a list of addresses, it drops the TPDU. If it determines that the TPDU contains a destination address that does not fall within the range of a list, it forwards the TPDU to its final destination.

Examples The following example enables the verification of source IP addresses received in upstream TPDU's:

```
security verify source
```

Related Commands

Command	Description
redirect intermobile ip	Specifies the redirection of mobile-to-mobile traffic.
gprs plmn ip address	Specifies the IP address range of a PLMN.
show gprs access-point	Displays information about access points on the GGSN.

service gprs ggsn

To configure a router for gateway GPRS support node functions, use the **service gprs ggsn** command. To disable GGSN functionality, use the **no** form of this command.

```
service gprs ggsn
```

```
no service gprs ggsn
```

Syntax Description This command has no keywords or arguments.

Defaults Disabled

Command Modes Global configuration

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX, and the sgsn-datacom option was removed.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **service gprs ggsn** command to configure the router as a gateway GPRS support node.

Examples The following example configures the router as a GGSN:

```
service gprs ggsn
```

service gprs gtp-director

To configure a router for GTP Director Module (GDM) functions, use the **service gprs gtp-director** command. To disable GDM functionality, use the **no** form of this command.

service gprs gtp-director

no service gprs gtp-director

Syntax Description This command has no keywords or arguments.

Defaults Disabled

Command Modes Global configuration

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **service gprs gtp-director** command to configure the router for GTP director module (GDM) services. The router cannot be configured to provide GGSN and GDM services at the same time.

Examples The following example configures the router as a GTP director:

```
service gprs gtp-director
```

Related Commands	Command	Description
	encapsulation gtp	Specifies GTP as the encapsulation type for packets transmitted over the virtual template interface.
	gprs gtp-director retry-timeout	Specifies the amount of time during which the GTP director forwards retries from an SGSN to the selected GGSN.

session idle-time

To specify the time that the GGSN waits before purging idle mobile sessions for the current access point, use the **session idle-time** access-point configuration command. To disable the idle timer at the access point, use the **no** form of this command.

session idle-time *number*

no session idle-time *number*

Syntax Description

<i>number</i>	Number of hours between 1 and 168.
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Defaults

No session idle timer is configured on the access point.

Command Modes

Access-point configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

The GGSN implements the idle timer in 3 ways. These implementations are listed in the order in which the GGSN processes them.

- Radius server—If the access-point is configured for non-transparent access mode and the Radius server returns a session timeout attribute, then the GGSN uses the session idle timeout value from the Radius server.
- Access-point—If the access-point is configured for transparent access mode, or is in non-transparent access mode and the Radius server does not return a session idle timeout value, the GGSN uses the value that you specified for the **session idle-time** command.
- Global timer—If the GGSN does not get a session idle timeout value from the Radius server or the access-point, it uses the value that you specified in the **gprs idle-pdp-context purge-timer** command.

The **session idle-time** command value overrides the value configured in the **gprs idle-pdp-context purge-timer** command for that access-point.

When the session reaches the timeout value, the PDP context is deleted.

Use the **show gprs gtp pdp-context tid** command to view the session idle-time value. The value is shown in the “gtp pdp idle time” field.

Examples

The following example specifies that the GGSN waits for 5 hours before purging idle time sessions for access-point 1. The GGSN waits for 60 hours before purging idle time sessions for all access points *except* access-point 1:

```
gprs access-point-list abc
  access-point 1
    access-point-name gprs.pdn1.com
    session idle-time 5

gprs idle-pdp-context purge-timer 60
```

Related Commands

Command	Description
gprs idle-pdp-context purge-timer	Specifies the time that the GGSN waits before purging idle mobile sessions.
show gprs gtp pdp-context	Displays a list of the currently active PDP contexts (mobile sessions).

show gprs access-point

To display information about access points on the GGSN, use the **show gprs access-point** privileged EXEC command.

show gprs access-point {*access-point-index* [**address-allocation**] | **all**}

Syntax Description		
	<i>access-point-index</i>	Integer (from 1 to 65535) that identifies a GPRS access point. Information about that access point is shown.
	<i>access-point-index</i> address-allocation	TID and dynamically allocated mobile station (MS) addresses (by either a DHCP or RADIUS server) for PDP contexts on the specified access point are shown.
	all	Information about all access points on the GGSN is shown.

Defaults No default behavior or values.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.	

Release	Modification
12.2(4)MX	<p>This command was incorporated in Cisco IOS Release 12.2(4)MX.</p> <ul style="list-style-type: none"> • The following output fields were added to the display: <ul style="list-style-type: none"> - accounting - aggregate - apn_accounting_server_group - apn_authentication_server_group - apn-type - apn_username - apn_password - Block Roamer Mode - GPRS vaccess interface - VPN - wait_accounting • The following output fields were removed from the display: <ul style="list-style-type: none"> - apn_charging_gw - apn_backup_charging_gw - apn_radius_server • Several output field results were changed from binary 0 and 1 to Yes and No. • The following output fields were added to the all version of this command: <ul style="list-style-type: none"> - Access-type - ppp-regeneration (max-session, setup-time) - VRF Name
12.2(8)YD	<p>This command was incorporated in Cisco IOS Release 12.2(8)YD and the Block Roamer Mode output field was changed to Block Foreign-MS Mode output field.</p>
12.2(8)YW	<p>This command was incorporated in Cisco IOS Release 12.2(8)YW.</p> <ul style="list-style-type: none"> • The following output fields were added to the display: <ul style="list-style-type: none"> - input ACL - output ACL - backup - RADIUS attribute suppress MSISDN - RADIUS attribute suppress IMSI - RADIUS attribute suppress SGSN Address - RADIUS attribute suppress QoS • The format of the apn_username: , apn_password: display fields was changed to apn_username: apn_password:.

Usage Guidelines

Use the *access-point-index* argument to specify a particular access point number for which you want to obtain information.

Use the **address-allocation** keyword, to obtain information about dynamically allocated MS addresses and lease terms by access point.

Use the **all** keyword to obtain information about all access points in an abbreviated format.

Examples**Example 1**

The following is sample output of the **show gprs access-point** command for access-point 1:

```
router# show gprs access-point 1
  apn_index 1          apn_name = gprs.corporate.com
  apn_mode: transparent
  apn-type: Real
  accounting: Disable
  wait_accounting: Disable
  input ACL: None, output ACL: None
  dynamic_address_pool: dhcp-proxy-client
  apn_dhcp_server: 10.99.100.5      backup: 10.99.100.4
  apn_dhcp_gateway_addr: 10.27.1.1
  apn_authentication_server_group: foo
  apn_accounting_server_group: fool
  apn_username:  apn_password:
  subscribe_required: No
  deactivate_pdp_context_on_violation: Yes
  network_activation_allowed: Yes
  Block Foreign-MS Mode: Disable
  VPN: Disable (VRF Name : None)
  GPRS vaccess interface: Virtual-Access2
  RADIUS attribute suppress MSISDN: Disabled
  RADIUS attribute suppress IMSI: Disabled
  RADIUS attribute suppress SGSN Address: Disabled
  RADIUS attribute suppress QoS
  number of ip_address_allocated 0
  idle timer: 0
  Security features
    Verify mobile source addr: enable
    Verify mobile destination addr: enable

  Traffic redirection:
    Mobile-to-mobile: destination 1.1.1.1

  Total number of PDP in this APN :0

  aggregate:
  In APN:      Disable

  In Global: Disable
```

Table 5 describes the fields show in the display.

Table 5 *show gprs access-point Field Descriptions*

Field	Description
accounting	<p>Current status of accounting services at the APN:</p> <ul style="list-style-type: none"> • Enable—Accounting services are enabled at the APN. This is the default for non-transparent access APNs. • Disable—Accounting services are disabled at the APN. This is the default for transparent access APNs. <p>You can configure an APN for accounting services using the aaa-accounting access-point configuration command.</p>
aggregate	<p>Route aggregation configuration information on the GGSN.</p> <p>The output display includes the “In APN” field for configuration information for the access point, and the “In global” field for global configuration on the GGSN.</p> <p>The output field may contain the following information:</p> <ul style="list-style-type: none"> • IP network address and mask for which PDP requests on the access point will be collectively routed over the virtual template interface on the GGSN. IP address and mask information appears if an aggregate range has been configured on the GGSN. • auto—Indicates that the GGSN uses the allocated IP mask from the DHCP or RADIUS server to perform route aggregation on the APN. This keyword appears when the APN has been configured with the aggregate auto access-point configuration command. This value only applies to the APN. • Disable—Indicates that route aggregation is not configured at either the APN or global level.
apn_accounting_server_group	Name of the AAA server group providing accounting services.
apn_authentication_server_group	Name of the AAA server group providing authentication services.
apn_dhcp_gateway_addr	IP address of the DHCP gateway, if configured.
apn_dhcp_server	IP address of the DHCP server, if configured.
apn_index	Number assigned to this access point.
apn_mode	<p>Current setting for the access-mode command:</p> <ul style="list-style-type: none"> • Transparent—Users are allowed access without authorization or authentication. • Non-transparent—Users must be authenticated by the GGSN acting as a proxy for the authentication.
apn_name	Access point name.

Table 5 show gprs access-point Field Descriptions

Field	Description
apn-type	Current setting for the access-type command: <ul style="list-style-type: none"> • Real—APN type that corresponds to a physical interface to an external network on the GGSN. • Virtual—APN type that is not associated with any specific physical target network.
apn_username	Username specified in the anonymous user command. If the anonymous user command is not configured, this field will be blank.
apn_password	Password specified in the anonymous user command. If the anonymous user command is not configured, this field will be blank.
backup	IP address of the backup DHCP server, if configured.
Block Foreign-MS Mode	Current setting for the block-foreign-ms command: <ul style="list-style-type: none"> • Enable—Blocking for foreign MSs is configured. • Disable—Blocking for foreign MSs is not configured.
deactivate_pdp_context_on_violation	Current setting for the access-violation command: <ul style="list-style-type: none"> • No—User packets are discarded. • Yes—Mobile sessions are terminated when there is an access violation.
dynamic_address_pool	Current setting for the ip-address-pool command.
GPRS vaccess interface	Name of the virtual access interface associated with the VPN. If no VPN is configured at the access point, the name of the virtual access interface for the GGSN virtual template is shown, which is always Virtual-Access1.
idle_timer	Amount of time the GGSN will wait before purging idle mobile sessions for the access point configured using the session idle-time command.
input ACL	IP access list for inbound packets (Gi to Gn interfaces).
Mobile-to-Mobile	Current setting for the redirect intermobile ip command.
network_activation_allowed	Indicates whether network-initiated PDP context support is configured using the network-request-activation command: <ul style="list-style-type: none"> • No—Network-initiated PDP context support is disabled. • Yes—Network-initiated PDP context support is enabled.
number of ip_address_allocated	Number of IP addresses allocated to MS users.
output ACL	IP access list for outbound packets (Gn to Gi interfaces).

Table 5 *show gprs access-point Field Descriptions*

Field	Description
RADIUS attribute suppress IMSI	Current setting for the radius attribute suppress imsi command: <ul style="list-style-type: none"> • Enabled—GGSN suppresses the 3GPP-IMSI number in its authentication and accounting requests to a RADIUS server. • Disabled—GGSN does not suppress the 3GPP-IMSI number in its authentication and accounting requests to a RADIUS server.
RADIUS attribute suppress MSISDN	Current setting for the msisdn suppression command: <ul style="list-style-type: none"> • Enabled—GGSN overrides or suppresses the MSISDN number in its RADIUS authentication. • Disabled—GGSN does not override or suppress the MSISDN number in its RADIUS authentication.
RADIUS attribute suppress SGSN Address	Current setting for the radius attribute suppress sgsn-address command: <ul style="list-style-type: none"> • Enabled—GGSN suppresses the 3GPP VSA 3GPP-SGSN-Address subattribute in its RADIUS authentication and accounting requests. • Disabled—GGSN does not suppress the 3GPP VSA 3GPP-SGSN-Address subattribute in its RADIUS authentication and accounting requests.
RADIUS attribute suppress QoS	Current setting for the radius attribute suppress qos command: <ul style="list-style-type: none"> • Enabled—GGSN suppresses the 3GPP VSA 3GPP-QoS-Profile subattribute in its RADIUS authentication and accounting requests. • Disabled—GGSN does not suppress the 3GPP VSA 3GPP-QoS-Profile subattribute in its RADIUS authentication and accounting requests.
subscribe_required	Current setting for the subscription-required command: <ul style="list-style-type: none"> • No—No subscription is required. • Yes—Subscription is required for access point users. The GGSN looks for the “subscription verified” selection mode in the PDP context request to establish the session.
Total number of PDP in this APN	Number of active PDP contexts for this access point.
Verify mobile source addr	Current setting for the security verify source command: <ul style="list-style-type: none"> • Enabled—GGSN verifies the source IP address of upstream TPDU against addresses previously assigned to MSs. • Disabled—GGSN does not verify the source IP address of upstream TPDU against addresses previously assigned to MSs.

Table 5 *show gprs access-point Field Descriptions*

Field	Description
Verify mobile destination addr	Current setting for the security verify destination command: <ul style="list-style-type: none"> • Enabled—GGSN verifies the destination address of upstream TPDUs against the global list of PLMN addresses specified using the gprs plmn ip address command. • Disabled—GGSN does not verify the destination address of upstream TPDUs against the global list of PLMN addresses specified using the gprs plmn ip address command.
VPN	Indicates whether a Virtual Private Network (VPN) is enabled or disabled at the access point.
VRF name	Name assigned to the VPN Routing and Forwarding instance. A value of None appears when VRF is not enabled at the access point.
wait_accounting	Current status of RADIUS accounting response message waiting at the APN: <ul style="list-style-type: none"> • Enable—GGSN waits for an accounting response message from the RADIUS server before sending an activate PDP context request to the SGSN. • Disable—GGSN sends an activate PDP context request to the SGSN after sending an accounting request to the RADIUS server. The GGSN does not wait for a RADIUS accounting response. <p>You can configure RADIUS accounting response message waiting using the gprs gtp response-message wait-accounting global configuration command, or the response-message wait-accounting access-point configuration command.</p>

Example 2

The following is sample output of the **show gprs access-point address-allocation** command:

```
router# show gprs access-point 8 address-allocation
```

```
TID                PDP_ADDRESS
1111111100000099  10.88.105.227
1111111100000191  10.88.105.7
1111111100000192  10.88.105.70
1111111100000297  10.88.106.162
1111111100000298  10.88.106.169
1111111100000299  10.88.106.161
1111111100000391  10.88.106.150
1111111100000392  10.88.106.25
1111111100000442  10.88.106.196
1111111100000443  10.88.106.197
1111111100000886  10.88.108.153
1111111100000887  10.88.108.158
2222222200000000  10.88.111.255
```

Table 6 describes the fields show in the display.

Table 6 *show gprs access-point address-allocation Field Descriptions*

Field	Description
TID	Tunnel ID for the PDP context request on the APN.
PDP_ADDRESS	IP address assigned to the PDP context request on the APN.

Example 3

The following is sample output of the **show gprs access-point all** command:

```
router# show gprs access-point all

There are 3 Access-Points configured

Index   Mode                Access-type   AccessPointName   VRF Name
-----
1       transparent         Real          corporate_1.com   corporate_1.com
      ppp-regeneration (max-session: 10000, setup-time: 60)
-----
2       non-transparent    Real          corporate_2.com
-----
3       transparent         Virtual       corporate_3.com
-----
```

Table 7 describes the fields show in the display.

Table 7 *show gprs access-point all Field Descriptions*

Field	Description
Index	Integer assigned to the access point in the GGSN configuration. The index number is used to reference an APN in GGSN commands.
Mode	Authorization configured on the access point. The possible values are: <ul style="list-style-type: none"> transparent—Users who access the PDN through the access point associated with the current virtual template are allowed access without authorization or authentication. non-transparent—Users who access the PDN through the current virtual template must be authenticated by the GGSN acting as a proxy for the authentication.
Access-type	Type of access point. The possible values are: <ul style="list-style-type: none"> Real—APN type that corresponds to an external physical network on the GGSN. This is the default value. Virtual—APN type that is not associated with any specific physical target network on the GGSN. Virtual APNs are used to simply HLR provisioning in the PLMN.
AccessPointName	Access point network ID, which is commonly an Internet domain name.

Table 7 *show gprs access-point all Field Descriptions*

Field	Description
ppp-regeneration (max-session, setup-time)	PPP regeneration session parameters configured at the access point: <ul style="list-style-type: none"> max-session—Maximum number of PPP regenerated sessions allowed at the access point. setup-time—Maximum amount of time (between 1 and 65535 seconds) within which a PPP regenerated session must be established.
VRF Name	Name of the VPN routing and forwarding instance associated with the APN.

Related Commands

Command	Description
access-point	Specifies an access point number and enters access-point configuration mode.

show gprs access-point statistics

To display data volume and PDP activation and deactivation statistics for access points on the GGSN, use the **show gprs access-point statistics** privileged EXEC command.

show gprs access-point statistics {*access-point-index* | **all**}

Syntax Description	<i>access-point-index</i>	Index number of an access point. Statistics for that access point are shown.
	all	Statistics for all access points on the GGSN are shown.

Defaults No default behavior or values.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **show gprs access-point statistics** command to display data volume and PDP activation and deactivation statistics for access points on the GGSN.

Use the *access-point-index* argument to specify a particular access point number for which you want to obtain information.

Use the **all** keyword to obtain information about all access points in an abbreviated format.

Examples The following example displays PDP context activation and deactivation statistics for all access points on the GGSN:

```
router# show gprs access-point statistics all

There are 3 Access-Points activated

Index   Mode           Access-type   AccessPointName   VRF Name
-----
1       transparent   Real         coporate_1.com    corporate_1.com
ppp-regeneration (max-session: 10000, setup-time: 60)
PDP activation initiated by MS:                3
Successful PDP activation initiated by MS:      3
Dynamic PDP activation initiated by MS:        3
Successful dynamic activation initiated by MS:  0
PDP deactivation initiated by MS:              0
Successful PDP deactivation initiated by MS:    0
Network initiated PDP activation:              0
Successful network initiated PDP activation:    0
PDP deactivation initiated by GGSN:            1
```

```

Successful PDP deactivation initiated by GGSN: 1
active PDP: 3
upstream data volume in octets: 0
downstream data volume in octets: 0
Src addr violation: 6 paks, 9136 bytes
Dest addr violation:
Redirected mobile-to-mobile traffic: 35 paks, 3480 bytes
-----
4      transparent      gprs.pdn.com
PDP activation initiated by MS: 1
Successful PDP activation initiated by MS: 1
Dynamic PDP activation initiated by MS: 0
Successful dynamic activation initiated by MS: 0
PDP deactivation initiated by MS: 0
Successful PDP deactivation initiated by MS: 0
Network initiated PDP activation: 0
Successful network initiated PDP activation: 0
PDP deactivation initiated by GGSN: 6
Successful PDP deactivation initiated by GGSN: 6
active PDP: 0
upstream data volume in octets: 0
downstream data volume in octets: 0
Src addr violation: 6 paks, 9136 bytes
Dest addr violation: 6 paks, 9136 bytes
Redirected mobile-to-mobile traffic: 35 paks, 3480 bytes
-----
5      transparent      gpru.pdn.com
PDP activation initiated by MS: 1
Successful PDP activation initiated by MS: 1
Dynamic PDP activation initiated by MS: 0
Successful dynamic activation initiated by MS: 0
PDP deactivation initiated by MS: 0
Successful PDP deactivation initiated by MS: 0
Network initiated PDP activation: 0
Successful network initiated PDP activation: 0
PDP deactivation initiated by GGSN: 0
Successful PDP deactivation initiated by GGSN: 6
active PDP: 0
upstream data volume in octets: 0
downstream data volume in octets: 0
Src addr violation: 6 paks, 9136 bytes
Dest addr violation: 6 paks, 9136 bytes
Redirected mobile-to-mobile traffic: 35 paks, 3480 bytes

```

Table 8 describes the fields shown in the display:

Table 8 *show gprs access-point statistics Field Descriptions*

Field	Description
active PDP	Number of PDP contexts that are currently established on the GGSN.
downstream data volume in octets	Number of bytes of data received by the GGSN from the PDN, or network.
Dest addr violation	Number of packets (and bytes) dropped by the GGSN because of a source address violation. This field displays only when the security verify destination command is configured. Note This field does not apply to APNs using VRF. In addition, verification of destination addresses does not apply to GTP-PPP regeneration or GTP-PPP with L2TP.

Table 8 show gprs access-point statistics Field Descriptions (continued)

Field	Description
Dynamic PDP activation initiated by MS	Number of Create PDP Context Request messages received by the GGSN from an MS without a PDP address. (Duplicate requests are not counted.)
Network initiated PDP activation	Number of Create PDP Context Request messages received by the GGSN from network initiation.
PDP activation initiated by MS	Number of Create PDP Context Request messages received by the GGSN from an SGSN. (Duplicate requests are not counted.)
PDP deactivation initiated by GGSN	Number of Delete PDP Context Request messages sent by the GGSN to an SGSN.
PDP deactivation initiated by MS	Number of Delete PDP Context Request messages received by the GGSN from an SGSN. (Duplicate messages are not counted.)
ppp-regeneration (max-session, setup-time)	PPP regeneration session parameters configured at the access point: <ul style="list-style-type: none"> max-session—Maximum number of PPP regenerated sessions allowed at the access point. setup-time—Maximum amount of time (between 1 and 65535 seconds) within which a PPP regenerated session must be established.
Redirected mobile-to-mobile traffic	Number of packets (and bytes) dropped at the APN from which they exit because mobile-to-mobile traffic has been redirected. This field displays only when the redirect intermobile ip command is configured.
Src addr violation	Number of packets (and bytes) dropped because of source address violation. This field displays only when the security verify source command is configured.
Successful dynamic activation initiated by MS	Number of Create PDP Context Response messages sent by the GGSN with a cause value of “GTP_RES_REQACCEPTED”, indicating that the PDP address has been dynamically assigned.
Successful network initiated PDP activation	Number of PDP contexts activated on the GGSN that were initiated by the network.
Successful PDP activation initiated by MS	Number of Create PDP Context Response messages sent by the GGSN with a cause value of “GTP_RES_REQACCEPTED.”
Successful PDP deactivation initiated by GGSN	Number of Delete PDP Context Response messages received by the GGSN from an SGSN.
Successful PDP deactivation initiated by MS	Number of Delete PDP Context Response messages sent by the GGSN to an SGSN with a cause value of “GTP_RES_REQACCEPTED”.
upstream data volume in octets	Number of bytes of data received by the GGSN from the SGSN.

Related Commands

Command	Description
clear gprs access-point statistics	Clears statistics counters for a specific access point or for all access points on the GGSN.
show gprs access-point	Displays information about access points on the GGSN.

show gprs charging parameters

To display information about the current GPRS charging configuration, use the **show gprs charging parameters** privileged EXEC command.

show gprs charging parameters

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
		The following output fields were added to the display: <ul style="list-style-type: none"> • Charging CDR Option Local Record Sequence Number • Charging CDR Option No Partial CDR Generation • Charging CDR Option Node ID • Charging CDR Option Packet Count • Charging Change Condition Limit • Charging Send Buffer Size • Charging GTP' Port Number • Charging MCC Code • Charging MNC Code • Charging Roamers CDR Only • Charging HPLMN Matching Criteria • Charging SGSN Limit
		The following output fields were removed from the display: <ul style="list-style-type: none"> • Charging MCC Code • Charging MNC Code • Charging HPLMN Matching Criteria

Release	Modification
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in the Cisco IOS Release 12.2(8)YW. <ul style="list-style-type: none"> • The Charging Path Protocol field was changed from binary 0 and 1 to udp and tcp. • The Charging qos-info output field was changed to Charging release. • The following output fields were added to the display: <ul style="list-style-type: none"> – Charging Time Limit – Charging qos-info – Charging Transfer Format. – GTP' use short header

Usage Guidelines

Use the **show gprs charging parameters** command to display the currently active charging parameters for the GGSN.

Examples

The following is sample output of the **show gprs charging parameters** command:

```
router# show gprs charging parameters

GPRS Charging Protocol Parameters
=====

* Default Charging Gateway Address:      <9.9.9.9>
* Default Backup Charging Gateway Address:UNDEFINED.
* Current Active Charging Gateway Address:<9.9.9.9>
* Current Backup Charging Gateway Address:UNDEFINED.
* Charging Server Switch-Over Timer:     <15> seconds.
* Charging Path Protocol:                tcp
* GTP' use short header:                  DISABLED
* Charging Message Options:
  Transfer Request:
  - Packet Transfer Command IE:          ENABLED.
  Transfer Response:
  - Number Responded:                    DISABLED.
* Charging MAP DATA TOS:                 <3>
* Charging Transfer Interval:             <105> seconds.
* Charging Transfer Threshold:            <400> bytes.
* Charging CDR Aggregation Limit:         <255> CDRs per msg.
* Charging Packet Queue Size:             <128> messages.
* Charging Gateway Path Request Timer:    <1> Minutes.
* Charging Change Condition Limit:        <5>
* Charging SGSN Limit:                    DISABLED.
* Charging Time Limit:                    <3000>
* Charging Send Buffer Size:               <1460>
* Charging Port Number:                   <3386>
* Charging Roamers CDR Only:              DISABLED.
* Charging CDR Option:
  - Local Record Sequence Number:        DISABLED.
  - APN Selection Mode:                   DISABLED.
  - No Partial CDR Generation:            DISABLED.
  - Node ID:                              DISABLED.
  - Packet Count:                         DISABLED.
  - Served MSISDN:                       DISABLED.
```

```

- Private Echo:                               DISABLED.
* Charging release:                            99
* Charging Tariff Time Changes:
- Tariff Time Change (#0):                    04:04:01
- Tariff Time Change (#1):                    17:00:00
- Tariff Time Change (#2):                    21:25:00

```

Table 9 describes the fields shown in the display.

Table 9 *show gprs charging parameters Field Descriptions*

Field	Description
Charging CDR Aggregation Limit	Maximum number of CDRs that the GGSN aggregates in a charging data transfer message to the charging gateway. You can configure this limit using the gprs charging cdr-aggregation-limit command.
Charging CDR Option: Local Record Sequence Number	Status indicating if the GGSN uses the local record sequence field in G-CDRs. The possible values are enabled or disabled. You can enable the GGSN to use the local record sequence field in G-CDRs using the gprs charging cdr-option local-record-sequence-number command.
Charging CDR Option: APN Selection Mode	Status indicating if the GGSN provides the reason code for APN selection in G-CDRs. The possible values are enabled or disabled. You can enable the GGSN to provide the APN selection mode in G-CDRs using the gprs charging cdr-option apn-selection-mode command.
Charging CDR Option: No Partial CDR Generation	Status indicating if the GGSN can create partial CDRs. The possible values are enabled or disabled. You can disable partial CDR generation by the GGSN using the gprs charging cdr-option no-partial-cdr-generation command.
Charging CDR Option: Node ID	Status indicating if the GGSN specifies the name of the node that generated the CDR in the node ID field of the G-CDR. The possible values are enabled or disabled. You can enable the GGSN to use the node ID field in G-CDRs using the gprs charging cdr-option node-id command.
Charging CDR Option: Packet Count	Status indicating if the GGSN provides uplink and downlink packet counts in the optional record extension field of a G-CDR. The possible values are ON or OFF. You can enable the GGSN to provide packet counts using the gprs charging cdr-option packet-count command.

Table 9 show gprs charging parameters Field Descriptions (continued)

Field	Description
Charging CDR Option: Served MSISDN	<p>Status indicating if the GGSN provides the mobile station integrated services digital network number from the create PDP context request in a G-CDR. The possible values are enabled or disabled.</p> <p>You can enable the GGSN to provide the MSISDN number using the gprs charging cdr-option served-msisdn command.</p>
Charging CDR Option: Private Echo	<p>Status indicating if the GGSN uses private echo signaling for flow control. The possible values are enabled or disabled.</p> <p>You can enable private echo signaling using the gprs charging flow-control private-echo command.</p>
Charging Change Condition Limit	<p>Maximum number of charging containers in each G-CDR.</p> <p>You can configure the change condition limit using the gprs charging container change-limit command.</p>
Charging Gateway Path Request Timer	<p>Number of minutes that the GGSN waits before trying to establish the TCP path to the charging gateway when TCP is the specified path protocol.</p> <p>You can configure the path request timer using the gprs charging cg-path-requests command.</p>
Charging MAP DATA TOS	<p>Type of service (ToS) priority currently configured for GPRS charging packets. Value (between 0 and 5) is set in the precedence bits of the IP header of charging packets.</p> <p>You can configure the ToS mapping using the gprs charging map data tos command.</p>
Charging Message Options: Transfer Request	<p>Whether the GGSN includes the Packet Transfer Command IE in the Data Record Transfer Response messages.</p> <p>The possible values are ENABLED (the GGSN includes the Packet Transfer Command IE) or DISABLED (the GGSN does not include the IE).</p>
Charging Messages Options: Transfer Response	<p>Whether the GGSN is using the Number of Requests Responded field instead or the Length field in the Requests Responded IE of Data Record Transfer Response messages.</p> <p>The possible values are ENABLED (the GGSN uses the Number of Requests Responded field) or DISABLED (the GGSN uses the Length field).</p>
Charging Packet Queue Size	<p>Maximum number of unacknowledged charging data transfer requests that the GGSN maintains in its queue.</p> <p>You can configure the maximum queue size using the gprs charging packet-queue-size command.</p>

Table 9 show gprs charging parameters Field Descriptions (continued)

Field	Description
Charging Path Protocol	Protocol in use between the GGSN and the charging gateway. The possible values are udp or tcp. You can configure the charging path protocol using the gprs charging path-protocol command.
Charging Port Number	Destination port of the charging gateway. You can configure the destination port using the gprs charging port command.
Charging release	Whether UMTS (R99) and GSM (R97/R98) QoS profile formats are presented in G-CDRs. The possible values are 99 (GSM and UMTS QoS profile formats are presented) or 98 (only GSM QoS profile formats are presented). You can configure the type of QoS profile format to be included using the gprs charging release command.
Charging Roamers CDR Only	Status of the charging for roamers feature on the GGSN. The possible values are enabled or disabled. You can configure the GGSN to support creation of CDRs for roaming subscribers using the gprs charging roamers command.
Charging Send Buffer Size	Size (in bytes) of the buffer that contains the GTP' PDU and signaling messages on the GGSN. You can configure the buffer size using the gprs charging send-buffer command.
Charging Server Switch-Over Timer	Amount of time (in seconds) that the GGSN waits before sending charging data to the backup charging gateway, after the active charging gateway fails. You can configure this period of time using the gprs charging server-switch-timer command.
Charging SGSN Limit	Maximum number of SGSN changes that can occur before the GGSN closes a G-CDR for a particular PDP context.
Charging Tariff Time Changes	Time of day when GPRS charging tariffs change. You can configure this time using the gprs charging tariff-time command.
Charging Transfer Interval	Amount of time (in seconds) that the GGSN waits before checking and sending any closed CDRs to the charging gateway. You can configure this period of time using the gprs charging transfer interval command.

Table 9 *show gprs charging parameters Field Descriptions (continued)*

Field	Description
Charging Transfer Threshold	<p>Maximum size (in bytes) that the GGSN maintains in a charging container before closing it and updating the CDR.</p> <p>You can configure the container volume using the gprs charging container volume-threshold command.</p>
Current Active Charging Gateway Address	<p>IP address of the charging gateway to which the GGSN is currently sending charging data.</p> <p>You can configure the primary charging gateway using the gprs default charging-gateway command.</p>
Current Backup Charging Gateway Address	<p>IP address of the backup charging gateway to which the GGSN will send charging data if the current active charging gateway becomes unavailable.</p> <p>You can configure the backup charging gateway using the gprs default charging-gateway command.</p>
Default Backup Charging Gateway Address	<p>IP address of the default secondary, or backup, charging gateway.</p> <p>You can configure the default backup charging gateway using the gprs default charging-gateway command.</p>
Default Charging Gateway Address	<p>IP address of the default primary charging gateway.</p> <p>You can configure the default primary charging gateway using the gprs default charging-gateway command.</p>
GTP' use short header	<p>Whether the GGSN is using the GTP short header (6-byte header). The possible values are ENABLED (the GGSN is using the GTP short header) or DISABLED (the GGSN is using the GTP long header).</p> <p>You can configure the GGSN to use the GTP short header using the gprs charging header short command.</p>

Related Commands

Command	Description
show gprs charging statistics	Displays cumulative charging statistics for the GGSN.

show gprs charging statistics

To display cumulative charging statistics for the GGSN, use the **show gprs charging statistics** privileged EXEC command.

show gprs charging statistics

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX, and the statistics were changed to be cumulative since the last restart of the GGSN and the keyword options were removed.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **show gprs charging statistics** command to display cumulative charging statistics since the last restart of the GGSN.

Examples The following is sample output of the **show gprs charging statistics** command:

```
router# show gprs charging statistics all
      GPRS Charging Protocol Statistics
      =====
* Total Number of CDRs for Charging:           <200>
* Total Number of Containers for Charging:      <104>
* Total Number of CDR_Output_Msgs sent:        <22>

-- Charging Gateway Statistics --
* Charging Gateway Down Count:                 <1>
* Last Charging Gateway Down Time = 2001/11/29 15:23:0
```

Table 10 describes the fields shown in the display.

Table 10 *show gprs charging statistics Field Descriptions*

Field	Description
Total Number of CDRs for Charging	Cumulative number of open and closed G-CDRs on the GGSN since the last startup of the GGSN.
Total Number of Containers for Charging	Cumulative number of all open and closed charging containers for all G-CDRs on the GGSN since the last startup of the GGSN.
Total Number of CDR_Output_Msgs sent	Cumulative number of G-CDR output messages that the GGSN sent to the charging gateway and received acknowledgment for since the last startup of the GGSN.
Charging Gateway Down Count	Number of times that the charging gateway has transitioned its state (from up or unknown, to down) since the last startup of the GGSN.
Last Charging Gateway Down Time	Recorded system time when the charging gateway was last in a down state. This statistics only appears if a charging gateway has been down.

Related Commands

Command	Description
show gprs charging parameters	Displays information about the current GPRS charging configuration.
show gprs charging status	Displays current charging statistics for the GGSN.

show gprs charging status

To display current charging statistics for the GGSN, use the **show gprs charging status** privileged EXEC command.

```
show gprs charging status {tid tunnel_id | access-point access-point-index | all}
```

Syntax Description	Parameter	Description
	tid <i>tunnel_id</i>	Specifies a tunnel ID for which you want to display charging statistics.
	access-point <i>access-point-index</i>	Specifies the index of the access point for which you want to display charging statistics.
	all	Requests display of all charging statistics.

Defaults No default behavior or values.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD and the Number of partial CDRs output field was changed to the Number of closed CDRs buffered.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **show gprs charging status** command to display current charging statistics for the GGSN since the last G-CDR was sent.

Examples

Example 1

The following is sample output of the **show gprs charging status tid** command:

```
router# show gprs charging status tid 1231231111111100
          GPRS Charging Protocol Status for TID
          =====
          * Number of CDRs :                <1>
          * Number of closed CDRs buffered:  <0>
          * Number of Containers:           <0>
```

Table 11 describes the fields shown in the display.

Table 11 show gprs charging status tid Field Descriptions

Field	Description
Number of CDRs	Number of currently open and closed G-CDRs on the GGSN for the specified TID, since the last G-CDR was successfully sent to the charging gateway.
Number of closed CDRs buffered	Number of currently closed G-CDRs that the GGSN has not yet sent to the charging gateway for the specified TID.
Number of Containers	Number of all currently open and closed charging containers for the specified TID, since the last G-CDR was successfully sent to the charging gateway.

Example 2

The following is sample output of the **show gprs charging status access-point** command:

```
router# show gprs charging status access-point 1

GPRS Charging Protocol Status for APN
=====

* Number of CDRs: <96>
* Number of closed CDRs buffered: <0>
* Number of Containers: <0>
```

Table 12 describes the fields shown in the display.

Table 12 show gprs charging status access-point Field Descriptions

Field	Description
Number of CDRs	Number of currently open and closed G-CDRs on the GGSN for the specified access point, since the last G-CDR was successfully sent to the charging gateway.
Number of closed CDRs buffered	Number of currently closed G-CDRs that the GGSN has not yet sent to the charging gateway for the specified access point.
Number of Containers	Number of all currently open and closed charging containers for the specified access point, since the last G-CDR was successfully sent to the charging gateway.

Example 3

The following is sample output of the **show gprs charging status all** command:

```
router# show gprs charging status all
GPRS Charging Protocol Status
=====

* Number of APNs : <1>
* Number of CDRs : <96>
* Number of closed CDRs buffered: <0>
* Number of Containers buffered: <0>
* Number of pending unack. CDR_Output_Msgs: <1>
```

Table 13 describes the fields shown in the display.

Table 13 *show gprs charging status Field Descriptions*

Field	Description
Number of APNs	Number of access points for which charging data has currently been collected. This statistic appears in the all version of this command only.
Number of CDRs	Number of currently open and closed G-CDRs on the GGSN since the last G-CDR was successfully sent to the charging gateway. For the tid and access-point versions of this command, this is the number of currently open and closed G-CDRs for the specified TID or access point.
Number of closed CDRs buffered	Number of currently closed G-CDRs that the GGSN has not yet sent to the charging gateway. For the tid and access-point versions of this command, this is the number of currently closed G-CDRs for the specified TID or access-point that have not yet been sent to the charging gateway.
Number of Containers buffered	Number of all currently open and closed charging containers since the last G-CDR was successfully sent to the charging gateway.
Number of pending unack. CDR_Output_Msgs	Number of G-CDR output messages sent by the GGSN that are not acknowledged by the charging gateway.

Related Commands

Command	Description
show gprs charging parameters	Displays information about the current GPRS charging configuration.
show gprs charging statistics	Displays cumulative charging statistics for the GGSN.

show gprs gtp ms

To display the currently active MSs on the GGSN, use the **show gprs gtp ms** privileged EXEC command.

```
show gprs gtp ms {imsi imsi | access-point access-point-index | all}
```

Syntax Description

imsi <i>imsi</i>	Displays MSs by International Mobile Subscriber Identity (IMSI). The IMSI can be up to 15 numeric digits. You can obtain the IMSI from the output for the show gprs gtp ms all command or the show gprs gtp pdp-context tid command.
access-point <i>access-point-index</i>	Displays MSs by access point.
all	Displays all MSs.

Defaults

No default behavior or values.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(8)YW	This command was introduced.

Usage Guidelines

Use the **show gprs gtp ms** command to display information about the mobile stations that are currently active on the GGSN. You can display the MS information according to access-point or IMSI. You can also display information for all MSs.

Examples

The following example displays information for all MSs:

```
router# show gprs gtp ms all
IMSI                MS ADDRESS        APN
1122334455665437   10.3.0.1          gprsa.apn.com
223456788765437    10.2.0.1          gprsb.apn.com
```

The following example displays information for all MSs on access-point 1:

```
router# show gprs gtp ms access-point 1
IMSI                MS ADDRESS        APN
1122334455665437   10.3.0.1          gprsa.apn.com
```

The following example displays information for all MSs on IMSI 110406080002045:

```
router# show gprs gtp ms imsi 110406080002045
IMSI          MS ADDRESS      APN
110406080002045  10.10.10.2      gprsc.apn.com

number of pdp:2
reference count:1
```

Table 14 describes the fields shown in the display.

Table 14 *show gprs gtp ms Field Descriptions*

Field	Description
IMSI	International mobile subscriber identity for the MSs.
MS ADDRESS	The IP address for the MSs.
APN	Access point name.
number of pdp	Number of PDP contexts on the MSs.
reference count	Internal data structure field. It is used only for internal troubleshooting purposes.

Related Commands

Command	Description
show gprs gtp pdp-context	Displays a list of the currently active PDP contexts (mobile sessions).
show gprs gtp status	Displays information about the current status of the GTP on the GGSN (such as activated PDP contexts, throughput, and QoS statistics).

show gprs gtp parameters

To display information about the current GPRS Tunneling Protocol (GTP) configuration on the GGSN, use the **show gprs gtp parameters** privileged EXEC command.

show gprs gtp parameters

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values.

Command Modes Privileged EXEC

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX. The following output fields were added to the display: <ul style="list-style-type: none"> • Charging MCC Code • Charging MNC Code • Charging HPLMN Matching Criteria • GTP dynamic echo-timer minimum • GTP dynamic echo-timer smooth factor The following output field was removed: <ul style="list-style-type: none"> • GTP max hold time for old gsn PDUs T3_tunnel
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD and the following output field was removed from the display: <ul style="list-style-type: none"> • GPRS HPLMN Matching Criteria
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines Use the **show gprs gtp parameters** command to display the current GTP parameters configured on the GGSN.

Examples The following is sample output of the **show gprs gtp parameters** command:

```
router# show gprs gtp parameters
      GTP path echo interval           = 60
      GTP signal max wait time T3_response = 1
      GTP max retry N3_request         = 5
      GTP dynamic echo-timer minimum    = 5
```

```

GTP dynamic echo-timer smooth factor      = 2
GTP buffer size for receiving N3_buffer    = 8192
GTP max pdp context                       = 45000
GPRS MCC Code                             = 310
GPRS MNC Code                             = 15

```

Table 15 describes the fields shown in the display.

Table 15 *show gprs gtp parameters Field Descriptions*

Field	Description
GPRS MCC Code	<p>Mobile country code (MCC) that the GGSN uses in conjunction with the mobile network node to determine whether a create PDP context request is from a roamer.</p> <p>You can configure the MCC using the gprs mcc mnc command.</p>
GPRS MNC Code	<p>Mobile network node (MNC) that the GGSN uses in conjunction with the mobile country code to determine whether a create PDP context request is from a roamer.</p> <p>You can configure the MNC using the gprs mcc mnc command.</p>
GTP buffer size for receiving N3_buffer	<p>Current size of the receive buffer (in bytes) that the GGSN uses to receive GTP signaling messages and packets sent through the tunneling protocol.</p> <p>You can configure the N3 buffer using the gprs gtp n3-buffer-size command.</p>
GTP dynamic echo-timer minimum	<p>Current minimum time period (in seconds) used by the dynamic echo timer.</p> <p>You can configure the minimum value using the gprs gtp echo-timer dynamic minimum command.</p>
GTP dynamic echo-timer smooth factor	<p>Current multiplier used by the GGSN to calculate the T-dynamic for the dynamic echo timer.</p> <p>You can configure the smooth factor using the gprs gtp echo-timer dynamic smooth-factor command.</p>
GTP max pdp context	<p>Current maximum number of PDP contexts (mobile sessions) that can be activated on the GGSN.</p> <p>You can configure the maximum number of PDP context requests using the gprs maximum-pdp-context-allowed command.</p>
GTP max retry N3_request	<p>Maximum number of times that the GGSN attempts to send a signaling request to an SGSN.</p> <p>You can configure the maximum number of signaling requests made by the GGSN using the gprs gtp n3-requests command.</p>

Table 15 *show gprs gtp parameters Field Descriptions (continued)*

Field	Description
GTP path echo interval	Interval, in seconds, that the GGSN waits before sending an echo-request message to the SGSN. You can configure the path echo interval using the gprs gtp path-echo-interval command.
GTP signal max wait time T3_response	Interval, in seconds, that the GGSN waits before responding to a signaling request message. You can configure the maximum interval using the gprs gtp t3-response command.

Related Commands

Command	Description
show gprs gtp statistics	Displays the current GTP statistics for the GGSN (such as IE, GTP signaling, and GTP PDU statistics).
show gprs gtp status	Displays information about the current status of the GTP on the GGSN (such as activated PDP contexts, throughput, and QoS statistics).

show gprs gtp path

To display information about one or more GTP paths between the GGSN and other GPRS devices, use the **show gprs gtp path** privileged EXEC command.

```
show gprs gtp path { remote-address ip-address [remote-port-num] | version gtp-version | all }
```

Syntax Description	
remote-address <i>ip-address</i> [<i>remote_port_num</i>]	Displays GTP path information for a specified remote IP address. Optionally, displays GTP path information for a specified remote IP address and port number.
version <i>gtp-version</i>	Displays the GTP paths by the GTP version (0 or 1).
all	Displays information for all GTP paths.

Defaults No default behavior or values.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX, and the following output field was added to the display: <ul style="list-style-type: none"> Dynamic echo timer
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW. <ul style="list-style-type: none"> The version keyword option and the option to display GTP path information for a remote IP address and remote port number were added. The GTP version output field was added to the display.

Usage Guidelines Use the **show gprs gtp path** command to display information about one or more GTP paths from the GGSN.

Examples

Example 1

The following example shows the output for the GTP path to the remote device with an IP address of 10.49.85.100:

```
router# show gprs gtp path 10.49.85.100
Local address      Remote address      GTP version      Dynamic echo timer
10.10.10.1(2123)   10.49.85.100(2123) 1                  5
10.10.10.1(2152)   10.49.85.100(2152) 1                  5
```

Example 2

The following example shows the output for the GTP path to the remote device with an IP address of 10.49.85.100 and remote port number 2123:

```
router# show gprs gtp path 10.49.85.100 2123
Local address      Remote address      GTP version      Dynamic echo timer
10.10.10.1(2123)   10.49.85.100(2123) 1                  5
```

Example 3

The following example shows the output for all paths on the GGSN that are using GTP version 1:

```
router# show gprs gtp path version 1
Local address      Remote address      GTP version      Dynamic echo timer
10.10.10.1(3386)   10.49.85.100(3386) 1                  5
10.10.10.1(3386)   10.7.7.7(3386)     1                  2
```

Example 4

The following example shows the output for all GTP paths on the GGSN:

```
router# show gprs gtp path all
Total number of path : 3
Local address      Remote address      GTP version      Dynamic echo timer
10.10.10.1(3386)   10.49.85.100(3386) 1                  Disabled
10.10.10.1(3386)   10.1.1.1(3386)     0                  2
10.10.10.1(3386)   10.7.7.7(3386)     1                  5
```

Table 16 describes the fields shown in the display.

Table 16 show gprs gtp path Field Descriptions

Field	Description
Total number of path	Total number of GTP paths currently established.
Dynamic echo timer	Current setting (in seconds) for the dynamic echo timer. “Disabled” appears when the dynamic echo timer is not in use.
Local address	IP address and port number for the local end of the GTP path.
Remote address	IP address and port number for the remote end of the GTP path, such as the address of the SGSN.
GTP version	Version of the GTP protocol (version 0 or 1) supported by the path.

show gprs gtp pdp-context

To display a list of the currently active PDP contexts (mobile sessions), use the **show gprs gtp pdp-context** privileged EXEC command.

```
show gprs gtp pdp-context {tid tunnel_id | ms-address ip_address [apn-index
access-point-index] | imsi imsi [nsapi nsapi [tft]] | path ip_address [remote-port-num] |
access-point access-point-index | pdp-type {ip | ppp} | qos-umts-class {background |
conversational | interactive | streaming} | qos {precedence {low | normal | high} | qos-delay
{class1 | class2 | class3 | classbesteffort} | version gtp-version} | all}
```

Syntax Description

tid <i>tunnel_id</i>	Displays PDP contexts by tunnel ID. This value corresponds to the IMSI plus NSAPI and can be up to 16 numeric digits.
ms-address <i>ip_address</i>	Displays PDP contexts for the specified mobile station IP address (in dotted-decimal format).
apn-index <i>access-point-index</i>	(Optional) Displays PDP contexts for the specified mobile station IP address at a particular access point. This option is required to display mobile stations that are accessing a private VPN.
imsi <i>imsi</i>	Displays PDP contexts by International Mobile Subscriber Identity (IMSI). The IMSI value can be up to 15 numeric digits.
nsapi <i>nsapi</i> [tft]	(Optional) Displays a particular PDP context by Network Service Access Point Identifier (NSAPI) for the specified IMSI. Optionally, displays the traffic flow template (TFT) filters associated with the NSAPI.
path <i>ip_address</i> [<i>remote_port_num</i>]	Displays PDP contexts by path. Optionally, displays PDP contexts by remote IP address and port number.
access-point <i>access-point-index</i>	Displays PDP contexts by access point. Possible values are 1 to 65535.
pdp-type {ip ppp}	Displays PDP contexts that are transmitted using either IP or PPP.
qos-umts-class	Displays PDPs by UMTS QoS traffic class. You can specify the following traffic classes: background , conversational , interactive , and streaming . This option is available when UMTS QoS is enabled.
qos-precedence	Displays PDP contexts for a specified GPRS QoS precedence type. You can specify the following precedence types: low , normal , and high . This option is available when GPRS QoS canonical QoS is enabled.
qos-delay	Displays PDP contexts for a specified GPRS quality of service delay class type. You can specify the following delay class types: class1 , class2 , class3 , and classbesteffort . This option is available when GPRS QoS delayed-based QoS is enabled.
version <i>gtp-version</i>	Displays PDP contexts by GTP version. The possible values are 0 or 1.
all	Displays all PDP contexts.

Defaults

No default behavior or values.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.
12.2(1)	The MS International PSTN/ISDN Number (MSISDN) field was added to the output display.
12.2(4)MX	<p>This command was incorporated in Cisco IOS Release 12.2(4)MX.</p> <ul style="list-style-type: none"> • The pdp-type ppp and qos-delay options were added to the command. • The following fields were added to the output display of the tid version of this command: <ul style="list-style-type: none"> - cef_down_byte - cef_down_pkt - cef_drop - cef_up_byte - cef_up_pkt - gtp pdp idle time • The Network Init Information section was added to the output display of the tid version of this command with the following new fields: <ul style="list-style-type: none"> - Buf.Bytes - MNRG Flag - NIP State - PDU Discard Flag - SGSN Addr • The following fields were removed from the output display of the tid version of this command: <ul style="list-style-type: none"> - fast_up_pkt - fast_up_byte - fast_down_pkt - fast_down_byte - fast_drop • The “dynamic?” and “Dynamic” fields were removed from the output display of the all and tid versions of this command, and were replaced by the Source field.

Release	Modification
12.2(8)YD	<p>This command was incorporated in Cisco IOS Release 12.2(8)YD and the following fields were added to the output display of the tid version of this command:</p> <ul style="list-style-type: none"> • primary dns • secondary dns • primary nbns • secondary nbns
12.2(8)YW	<p>This command was incorporated in the 12.2(8)YW.</p> <ul style="list-style-type: none"> • The the option of displaying PDP contexts by remote IP address and port number was added. • The delay QoS class(req.) output field was added to the display of the tid version of this command when the mapping of GPRS QoS categories to delay QoS classes is enabled. • The ms-address, imsi, qos-umts-class and version options were added to the command. • The ggsn_addr_signal field was changed to the ggsn_addr_data in the output display of the tid version of this command. • The following fields were added to the output display of the tid version of this command: <ul style="list-style-type: none"> – control teid local – control teid remote – data teid local – data teid remote – primary pdp – nsapi

Usage Guidelines

Use the **show gprs gtp pdp-context** command to display the currently active PDP contexts on the GGSN. You can display PDP contexts by tunnel ID, by IMSI, by access point, by PDP type, and by GPRS QoS precedence, UMTS QoS traffic class, or you can display all PDP contexts.

Several versions of the **show gprs gtp pdp-context** command display similar output. The examples provided show these two different types of output.

Interpreting the Effective Bandwidth

Example 2 provides sample output from the **show gprs gtp pdp-context tid** command, which includes the field called effective bandwidth (in bps). The effective bandwidth is determined according to the GPRS QoS canonical QoS class (premium, normal, or best effort) for the PDP context; it does not represent the actual bandwidth in use by the PDP context. The potential number of supported PDP contexts for that class of QoS can then be calculated according to the total amount of bandwidth (GSN resource) available to the GGSN.

For more information about GPRS QoS canonical QoS and resources on the GGSN, see the “Configuring QoS on the GGSN” chapter in the *Cisco IOS Mobile Wireless Configuration Guide*.

Examples

Example 1

The following is sample output of the **show gprs gtp pdp-context all** command:

```
router# show gprs gtp pdp-context all
TID           MS Addr      Source  SGSN Addr    APN
1234567890123456 10.11.1.1   Radius  10.4.4.11   www.pdn1.com
2345678901234567 Pending      DHCP    10.4.4.11   www.pdn2.com
3456789012345678 10.21.1.1   IPCP    10.1.4.11   www.pdn3.com
4567890123456789 10.31.1.1   IPCP    10.1.4.11   www.pdn4.com
5678901234567890 10.41.1.1   Static  10.4.4.11   www.pdn5.com
```



Note

The same output fields shown in Example 1 also appear when you use the **access-point**, **path**, **pdp-type**, **qos-delay**, or **qos-precedence** keyword options of the **show gprs gtp pdp-context** command.

Table 17 describes the fields shown in the display.

Table 17 show gprs gtp pdp-context all Field Descriptions

Field	Description
APN	Access point name where the PDP context is active.
MS Addr	IP address of the mobile station.
SGSN Addr	IP address of the SGSN that is processing the packets.
Source	Source of IP addressing for the MS. The possible values are: <ul style="list-style-type: none"> DHCP—Dynamic address allocation using DHCP. IPCP—Dynamic address allocation for PPP PDP types, or for IP PDP types with PPP regeneration, using PPP IP Control Protocol. Pending—Waiting for dynamic address allocation. Dynamic address source is unknown. Radius—Dynamic address allocation using RADIUS. Static—IP address is not dynamically assigned.
TID	Tunnel ID for the PDP context.

Example 2

The following is sample output from the **show gprs gtp pdp-context tid** command for a PDP context created by GTP version 1 and GPRS QoS canonical QoS is configured:

```
router# show gprs gtp pdp-context tid 1111111111111111
TID           MS Addr      Source  SGSN Addr    APN
1111111111111111 10.1.1.1   Radius  10.8.8.1     dns.com

current time :Mar 18 2002 11:24:36
user_name (IMSI):1111111111111111 MS address:10.1.1.1
MS International PSTN/ISDN Number (MSISDN):ABC
sgsn_addr_signal:10.8.8.1          sgsn_addr_data:10.8.0.1
control teid local: 0x63493E0C
control teid remove: 0x00000121
```

```

data teid local: 0x63483E10
data teid remote: 0x00000121
primary pdp: Y      nsapi: 0
signal_sequence: 0          seq_tpdu_up: 0
seq_tpdu_down: 0
upstream_signal_flow: 1     upstream_data_flow: 2
downstream_signal_flow:14   downstream_data_flow:12
RAupdate_flow: 0
pdp_create_time: Mar 18 2002 09:58:39
last_access_time: Mar 18 2002 09:58:39
mnrflag: 0              tos mask map:00
gtp pdp idle time:72
gprs qos_req:091101      canonical Qos class(req.):01
gprs qos_neg:25131F     canonical Qos class(neg.):01
effective bandwidth:0.0
rcv_pkt_count: 0         rcv_byte_count: 0
send_pkt_count: 0        send_byte_count: 0
cef_up_pkt: 0           cef_up_byte: 0
cef_down_pkt: 0         cef_down_byte: 0
cef_drop: 0
Src addr violation:      2 paks, 1024 bytes
Dest addr violation:    2 paks, 1024 bytes
Redirected mobile-to-mobile traffic: 2 paks, 1024 bytes
charging_id: 29160231
pdp reference count:2
primary dns: 2.2.2.2
secondary dns: 4.4.4.4
primary nbns: 3.3.3.3
secondary nbns: 5.5.5.5
ntwk_init_pdp: 0

** Network Init Information **
MNRG Flag: 0           PDU Discard Flag: 0
SGSN Addr: 172.16.44.1 NIP State: NIP_STATE_WAIT_PDP_ACTIVATION
Buf.Bytes: 500

```

Table 18 describes the fields shown in the display.



Note

The Network Init Information section of the output appears only while network-initiated PDP contexts are being processed by the GGSN.



Note

The same output fields shown in Example 2 also appear when you use the **imsi** keyword option of the **show gprs gtp pdp-context** command.

Table 18 *show gprs gtp pdp-context tid Field Descriptions*

Field	Description
APN	Access point name where the PDP context is active.
canonical Qos class (neg.)	Negotiated canonical quality of service class for the PDP context, with the following values: <ul style="list-style-type: none"> • 01—Best effort • 02—Normal • 03—Premium This field displays when GPRS QoS canonical QoS is enabled on the GGSN.
canonical Qos class (req.)	Requested GPRS canonical QoS class by the PDP context, with the following values: <ul style="list-style-type: none"> • 01—Best effort • 02—Normal • 03—Premium This field displays when GPRS QoS canonical QoS is enabled on the GGSN.
cef_down_byte	Total number of G-PDU bytes CEF switched on the downlink, from the GGSN to the SGSN.
cef_down_pkt	Total number of G-PDU packets CEF switched on the downlink, from the GGSN to the SGSN.
cef_drop	Total number of G-PDU packets dropped during CEF switching.
cef_up_byte	Total number of G-PDU bytes CEF switched on the uplink, from the SGSN to the GGSN.
cef_up_pkt	Total number of G-PDU packets CEF switched on the uplink, from the SGSN to the GGSN.
charging_id	Unique 4-octet value generated by the GGSN for the PDP context. The value 0 is reserved.
control teid local	Uplink tunnel endpoint identifier (TEID) chosen by the GGSN for control plane messages. This field displays for PDP contexts created with GTP version 1.
control teid remote	Downlink TEID chosen by the SGSN for control plane messages. This field displays for PDP contexts created with GTP version 1.
current time	Date and time of the show command output.
data teid local	Uplink TEID chosen by the GGSN for G-PDUs. This field displays for PDP contexts created with GTP version 1.
data teid remote	Downlink TEID chosen by the SGSN for PDUs. This field displays for PDP contexts created with GTP version 1.

Table 18 show gprs gtp pdp-context tid Field Descriptions (continued)

Field	Description
Dest addr violation	<p>Number of packets (and bytes) dropped by the GGSN because of a source address violation.</p> <p>This field displays only when the security verify destination command is configured.</p> <p>Note This field does not apply to APNs using VRF. In addition, verification of destination addresses does not apply to GTP-PPP regeneration or GTP-PPP with L2TP.</p>
downstream_data_flow	Flow label of downlink G-PDUs.
downstream_signal_flow	Flow label of downlink signaling messages.
effective bandwidth	<p>Estimated number of bits per second allocated by the GGSN for this PDP context. The effective bandwidth is determined according to the QoS class (premium, normal, or best effort) for the PDP context. The potential number of supported PDP contexts for that class of QoS can be calculated according to the total amount of bandwidth (GSN resource) available to the GGSN.</p> <p>This field displays when canonical QoS is enabled on the GGSN.</p> <p>Note The effective bandwidth does not represent actual bandwidth usage.</p>
gprs qos_neg	<p>Negotiated quality of service for the PDP context. The field is in the format <i>vwxyz</i>, which represents the following QoS classes (as defined in the GSM specifications for quality of service profiles):</p> <ul style="list-style-type: none"> • <i>v</i>—Delay class • <i>w</i>—Reliability class • <i>x</i>—Peak throughput class • <i>y</i>—Precedence class • <i>z</i>—Mean throughput class <p>Note To determine the GPRS QoS attributes shown in this output, you must convert the value to binary and interpret the values to find the corresponding class attributes. Some of the bits represent “don’t care” bits and are not interpreted as part of the final value. For more information about how to interpret this value, see the “Interpreting the Requested and Negotiated GPRS QoS” section of the “Configuring QoS” chapter in the <i>Cisco IOS Mobile Wireless Configuration Guide</i>.</p>

Table 18 show gprs gtp pdp-context tid Field Descriptions (continued)

Field	Description
gprs qos_req	Requested quality of service by the PDP context. The field is in the format vwxyz, which represents the following QoS classes (as defined in the GSM specifications for GPRS QoS profiles): <ul style="list-style-type: none"> v—Delay class w—Reliability class x—Peak throughput class y—Precedence class zz—Mean throughput class <p>Note See the Note in the description of the gprs qos_neg output field above.</p>
gtp pdp idle time	Current setting for the gprs idle-pdp-context purge-timer command, unless the session idle-time command is configured. Indicates the amount of idle time (in hours) allowed before PDP contexts are deleted.
last_access_time	Time when the PDP context for this TID was last accessed. The date format is MMM DD YYYY. The time format is hours:minutes:seconds. When a signaling packet or data packet for a PDP context arrives on the GGSN, the last_access_time is reset to the current date and time. If the last_access_time exceeds the purge timer for idle PDP contexts, then the PDP context is purged by the GGSN.
mnrflag	Mobile not reachable flag, with the following values: <ul style="list-style-type: none"> 0—flag is off. 1—flag is on, indicating that the MS is not reachable
MS_ADDR and MS Address	IP address of the mobile station.
MS International PSTN/ISDN Number (MSISDN)	Integrated Services Digital Network (ISDN) number of the mobile station.
nsapi	Network Service Access Point Identifier (NSAPI). This field displays for PDP contexts created with GTP version 1.
ntwk_init_pdp	Network initiated PDP context indicator, with the following values: <ul style="list-style-type: none"> 0—Not a network initiated PDP context. This indicates a mobile initiated PDP context. 1—Network initiated PDP context
pdp_create_time	Time when the PDP context for this TID was created. The date format is MMM DD YYYY. The time format is hours:minutes:seconds.

Table 18 show gprs gtp pdp-context tid Field Descriptions (continued)

Field	Description
pdp reference count	Number of subsystems on the GGSN that are aware of the PDP context. For example, if both the charging and GTP subsystems are aware of the PDP context, then the pdp reference counter shows a value of 2.
primary dns	IP address of the primary DNS server.
primary nbns	IP address of the primary NetBIOS Name Service (NBNS).
primary pdp	Whether the PDP is primary or secondary. Possible values are Y (PDP is primary) or N (PDP is secondary). This field displays for PDP contexts created with GTP version 1.
RAupdate_flow	Flow Label Data II information element in GTP header. This IE contains the flow label for data transmission between old and new SGSNs for a particular PDP context. This IE is requested by the new SGSN.
rcv_byte_count	Total number of G-PDU bytes received. For the GGSN, this is the total byte count on the uplink.
rcv_pkt_count	Total packet count of received G-PDUs. For the GGSN, this is the total byte count on the uplink.
Redirected mobile-to-mobile traffic	Number of packets (and bytes) dropped at the APN from which they exit because mobile-to-mobile traffic has been redirected. This field displays only when the redirect intermobile ip command is configured.
secondary dns	IP address of the secondary DNS server.
secondary nbns	IP address of the secondary NBNS.
send_byte_count	Total number of G-PDU bytes sent by the GSN (GGSN or SGSN D-node).
send_pkt_count	Total number of G-PDU packets sent by the GSN (GGSN or SGSN D-node).
seq_tpdu_down	Last sequence number used in the downlink T-PDU. This number wraps to 0 after 65535.
seq_tpdu_up	Last sequence number used in the uplink T-PDU. This number wraps to 0 after 65535.
sgsn_addr_signal	IP address of the SGSN that is processing the packets.
sgsn_addr_data	IP address of the SGSN that is processing tunnel packet data units (TPDUs).
signal_sequence	Last sequence number used in the GTP signaling message.

Table 18 *show gprs gtp pdp-context tid Field Descriptions (continued)*

Field	Description
Source	Source of IP addressing for the MS. The possible values are: <ul style="list-style-type: none"> • DHCP—Dynamic address allocation using DHCP. • IPCP—Dynamic address allocation for PPP PDP types, or for IP PDP types with PPP regeneration, using PPP IP Control Protocol. • Pending—Waiting for dynamic address allocation. Dynamic address source is unknown. • Radius—Dynamic address allocation using RADIUS. • Static—IP address is not dynamically assigned.
Src addr violation	Number of packets (and bytes) dropped because of source address violation. This field displays only when the security verify source command is configured.
TID	Tunnel ID for the PDP context.
tos mask map	ToS value in IP header of this PDP context.
umts qos_req	Requested UMTS quality of service by the PDP context. This field displays when UMTS QoS is enabled on the GGSN.
umts qos_neg	Negotiated UMTS quality of service for the PDP context. This field displays when UMTS QoS is enabled on the GGSN.
upstream_data_flow	Flow label of uplink G-PDUs.
upstream_signal_flow	Flow label of uplink signaling messages.
user_name (IMSI)	International mobile subscriber identity for the PDP context.

Table 19 describes the fields shown in the Network Init Information section of the output.

**Note**

The Network Init Information section of the output appears only when network-initiated PDP contexts are unsuccessful.

Table 19 *show gprs gtp pdp-context tid Network Init Information Field Descriptions*

Field	Description
Buf.Bytes	Number of bytes currently buffered for this network-initiated PDP context.
last_access_time	Time when the PDP context for this TID was last accessed. The date format is MMM DD YYYY. The time format is hours:minutes:seconds. When a signaling packet or data packet for a PDP context arrives on the GGSN, the last_access_time is reset to the current date and time. If the last_access_time exceeds the purge timer for idle PDP contexts, then the PDP context is purged by the GGSN.

Table 19 *show gprs gtp pdp-context tid Network Init Information Field Descriptions (continued)*

Field	Description
MNRG Flag	Mobile not reachable flag, with the following values: <ul style="list-style-type: none"> • 0—flag is off. • 1—flag is on, indicating that the MS is not reachable
NIP State	State information for the network initiated PDP process on the GGSN.
PDU Discard Flag	Discarded PDU indicator for a network initiated PDP context, with the following values: <ul style="list-style-type: none"> • 0—PDUs are not discarded. This indicates that PDUs for a network initiated PDP context are being sent to the SGSN. • 1—PDUs are being discarded by the GGSN. PDUs are discarded by the GGSN when a network initiated PDP context procedure is unsuccessful. This occurs when the SGSN sends a rejection of the PDP context request to the GGSN with a Cause value of either “MS Refuses” or “MS is not GPRS Responding.” <p>When the flag is set to 1, the GGSN ignores PDUs destined for that MS for the specified PDU discard period. The default period is 300 seconds (5 minutes). You can configure the PDU discard time using the gprs ntwk-init-pdp pdu-discard-period command.</p>
SGSN Addr	IP address of the SGSN that is associated with the network-initiated procedure for this PDP context (used for paging).

Related Commands

Command	Description
show gprs access-point	Displays information about access points on the GGSN.
show gprs gtp status	Displays information about the current status of the GTP on the GGSN (such as activated PDP contexts, throughput, and QoS statistics).

show gprs gtp statistics

To display the current GPRS Tunneling Protocol (GTP) statistics for the GGSN (such as IE, GTP signaling, and GTP PDU statistics), use the **show gprs gtp statistics** privileged EXEC command.

show gprs gtp statistics

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(2)GB	The following fields were added to the output display: <ul style="list-style-type: none"> total created_pdp total deleted_pdp
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX, and the following new output fields were added: <ul style="list-style-type: none"> ntwk_init_pdp_act_rej ppp_regen_pending ppp_regen_pending_peak ppp_regen_total_drop ppp_regen_no_resource total created_ppp_pdp total ntwkInit created pdp
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in the Cisco IOS Release 12.2(8)YW and the following new output fields were added: <ul style="list-style-type: none"> tft_semantic_error tft_syntactic_error packet_filter_semantic_error packet_filter_syntactic_error total deleted_ppp_pdp

Usage Guidelines

Use the **show gprs gtp statistics** command to display the GTP statistics for the GGSN. The counter values displayed by this command represent totals accumulated since the last time the statistical counters were cleared using the **clear gprs gtp statistics** command.

Examples

The following is sample output of the **show gprs gtp statistics** command:

```
router# show gprs gtp statistics
GPRS GTP Statistics:
  version_not_support      0          msg_too_short      0
  unknown_msg              0          unexpected_sig_msg  0
  unexpected_data_msg      0          mandatory_ie_missing 0
  mandatory_ie_incorrect  0          optional_ie_invalid  0
  ie_unknown               0          ie_out_of_order     0
  ie_unexpected            0          ie_duplicated        0
  optional_ie_incorrect    0          pdp_activation_rejected 10981
  tft_semantic_error       0          tft_syntactic_error  0
  pkt_ftr_semantic_error   0          pkt_ftr_syntactic_error 0
  non_existent             0          path_failure         0
  total_dropped            0          signalling_msg_dropped 0
  data_msg_dropped         0          no_resource          0
  get_pak_buffer_failure   0          rcv_signalling_msg   15401
  snd_signalling_msg       19243     rcv_pdu_msg          0
  snd_pdu_msg              0          rcv_pdu_bytes        0
  snd_pdu_bytes            0          total_created_pdp    3761
  total_deleted_pdp        3661     total_created_ppp_pdp 0
  total_deleted_ppp_pdp    0          ppp_regen_pending    0
  ppp_regen_pending_peak   0          ppp_regen_total_drop 0
  ppp_regen_no_resource    0          ntwk_init_pdp_act_rej 0
  total ntwkInit created pdp 0
```

Table 20 describes the fields shown in the display:

Table 20 *show gprs gtp statistics Field Descriptions*

Field	Description
data_msg_dropped	Number of GTP PDUs dropped.
get_pak_buffer_failure	Number of times the GGSN has failed to obtain a GTP packet.
ie_duplicated	Number of GTP messages received with a duplicated information element.
ie_out_of_order	Number of GTP messages received with an information element (IE) out of order.
ie_unexpected	Number of GTP messages received with an information element that not expected in the GTP message, but is defined in GTP. GTP messages with unexpected IEs are processed as if the IE was not present.
ie_unknown	Number of GTP messages received with an information element of an unknown type.
mandatory_ie_incorrect	Number of GTP messages received with an incorrect mandatory information element—for example, with an information element that has an incorrect length.

Table 20 *show gprs gtp statistics Field Descriptions*

Field	Description
mandatory_ie_missing	Number of GTP messages received with a missing mandatory information element.
msg_too_short	Number of GTP messages received that are too short to hold the GTP header for the supported GTP version.
no_resource	Number of times a resource was not available for transmitting GTP messages. For example, the router may be out of memory.
non-existent	Number of
ntwk_init_pdp_act_rej	Number of rejected PDP context requests that were initiated by the network (PDN).
optional_ie_incorrect	Number of GTP messages received with an optional IE that is incorrect, which prevents the GGSN from processing the GTP message correctly.
optional_ie_invalid	Number of GTP messages received with an information element that contains a value that is not within the defined range for that IE. GTP messages with invalid optional IEs are processed as if the IE was not present.
packet_filter_semantic_error	Number of GTP messages received with an IE element with packet filter semantic errors. A semantic error is when the defined format of the information element (IE) is valid but the content of the IE is inconsistent or invalid.
packet_filter_syntactic_error	Number of GTP messages received with an IE element with packet filter syntactic errors. A syntactic error is when the coding of the IE is invalid.
path_failure	Number of path failures on the GPRS Support Node (GSN).
pdp_activation_rejected	Number of times a request to activate a PDP context was rejected.
ppp_regen_no_resource	Total number of rejected responses to create PDP context and delete PDP context requests due to unavailable resource on the GGSN for PPP regeneration.
ppp_regen_pending	Number of pending PPP regeneration sessions.
ppp_regen_pending_peak	Maximum number of pending PPP regeneration sessions since the statistic was cleared.
ppp_regen_total_drop	Total number of create PDP context and delete PDP context requests that were dropped due to the threshold limit being reached for maximum number of PPP regeneration sessions allowed on the GGSN.
rcv_pdu_bytes	Number of bytes received in protocol data units (PDUs).
rcv_pdu_msg	Number of PDU messages received.
rcv_signaling_msg	Number of GTP signaling messages received.
signalling_msg_dropped	Number of GTP signaling messages dropped.
snd_pdu_bytes	Number of PDU bytes sent.
snd_pdu_msg	Number of PDU messages sent.
snd_signalling_msg	Number of GTP signaling messages sent.

Table 20 *show gprs gtp statistics Field Descriptions*

Field	Description
mandatory_ie_missing	Number of GTP messages received with a missing mandatory information element.
msg_too_short	Number of GTP messages received that are too short to hold the GTP header for the supported GTP version.
no_resource	Number of times a resource was not available for transmitting GTP messages. For example, the router may be out of memory.
non-existent	Number of
ntwk_init_pdp_act_rej	Number of rejected PDP context requests that were initiated by the network (PDN).
optional_ie_incorrect	Number of GTP messages received with an optional IE that is incorrect, which prevents the GGSN from processing the GTP message correctly.
optional_ie_invalid	Number of GTP messages received with an information element that contains a value that is not within the defined range for that IE. GTP messages with invalid optional IEs are processed as if the IE was not present.
packet_filter_semantic_error	Number of GTP messages received with an IE element with packet filter semantic errors. A semantic error is when the defined format of the information element (IE) is valid but the content of the IE is inconsistent or invalid.
packet_filter_syntactic_error	Number of GTP messages received with an IE element with packet filter syntactic errors. A syntactic error is when the coding of the IE is invalid.
path_failure	Number of path failures on the GPRS Support Node (GSN).
pdp_activation_rejected	Number of times a request to activate a PDP context was rejected.
ppp_regen_no_resource	Total number of rejected responses to create PDP context and delete PDP context requests due to unavailable resource on the GGSN for PPP regeneration.
ppp_regen_pending	Number of pending PPP regeneration sessions.
ppp_regen_pending_peak	Maximum number of pending PPP regeneration sessions since the statistic was cleared.
ppp_regen_total_drop	Total number of create PDP context and delete PDP context requests that were dropped due to the threshold limit being reached for maximum number of PPP regeneration sessions allowed on the GGSN.
rcv_pdu_bytes	Number of bytes received in protocol data units (PDUs).
rcv_pdu_msg	Number of PDU messages received.
rcv_signaling_msg	Number of GTP signaling messages received.
signalling_msg_dropped	Number of GTP signaling messages dropped.
snd_pdu_bytes	Number of PDU bytes sent.
snd_pdu_msg	Number of PDU messages sent.
snd_signalling_msg	Number of GTP signaling messages sent.

Table 20 *show gprs gtp statistics Field Descriptions*

Field	Description
tft_semantic_error	Number of GTP messages received with an IE element with traffic flow template (TFT) semantic errors. A semantic error is when the defined format of the information element (IE) is valid but the content of the IE is inconsistent or invalid.
tft_syntactic_error	Number of GTP messages received with an IE element with TFT syntactic errors. A syntactic error is when the coding of the IE is invalid.
total_created_pdp	Total number of PDP contexts created since system startup (supports Special Mobile Group (SMG)-28 standards level and later)
total_created_ppp_pdp	Total number of PDP contexts created for PPP PDP PDU types.
total_deleted_pdp	Total number of PDP contexts deleted since system startup (supports SMG-28 standards level and later)
total_deleted_ppp_pdp	Total number of PDP contexts created for PPP PDP PDU types deleted since system startup.
total_dropped	Number of GTP messages dropped.
total_ntwkInit_created_pdp	Number of PDP context requests activated by the GGSN that were initiated by the network (PDN).
unexpected_data_msg	Number of GTP PDUs received for nonexistent PDP contexts.
unexpected_sig_msg	Number of unexpected GTP signaling messages received—for example, a message received on the wrong end of the tunnel or a response message received for a request that was not sent by the GGSN.
unknown_msg	Number of unknown GTP messages received.
version_not_support	Number of GTP messages received from devices running an unsupported version of the GTP.

Related Commands

Command	Description
show gprs gtp parameters	Displays the current GTP parameters configured on the GGSN.
show gprs gtp path	Displays information about one or more GTP paths between the GGSN and other GPRS devices.
show gprs gtp pdp-context	Displays a list of the currently active PDP contexts (mobile sessions).
show gprs gtp status	Displays information about the current status of GTP on the GGSN.
show gprs charging statistics	Displays current statistics for the transfer of charging packets between the GGSN and charging gateways.

show gprs gtp status

To display information about the current status of the GPRS Tunneling Protocol (GTP) on the GGSN (such as activated PDP contexts, throughput, and QoS statistics), use the **show gprs gtp status** privileged EXEC command.

show gprs gtp status

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX, and the following output fields were added: <ul style="list-style-type: none"> • activated_ppp_pdp • activated_ppp_regen_pdp • ntwk_init_pdp • qos_delay1_pdp • qos_delay2_pdp • qos_delay3_pdp • qos_delaybesteffort_pdp
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in the Cisco IOS Release 12.2(8)YW and the following output fields were added: <ul style="list-style-type: none"> • activated gtpv0 pdp • activated gtpv1 pdp • activated ms

Usage Guidelines Use the **show gprs gtp status** command to display information about the status of GTP running on the GGSN. The output fields displayed by the **show gprs gtp status** command vary by the type of QoS method that is enabled on the GGSN.

The values displayed by the **show gprs gtp status** command show the current counts since the GGSN was started. Unlike the values displayed by the **show gprs gtp statistics** command, these values cannot be cleared.

Examples

Example 1

The following example shows output from the **show gprs gtp status** command for an activated network-initiated PDP context using the canonical QoS method:

```
Router# show gprs gtp status
GPRS GTP Status:
  gsn_used_bandwidth      7399   total_gsn_resource      4294967295
  activated_pdp            1     ntwk_init_pdp           1
  mean_throughput_premium  1110.000
  mean_throughput_normal  0.000  mean_throughput_besteffort 0.000
  qos_high_pdp            1     qos_normal_pdp          0
  qos_low_pdp             0     qos_premium_mean-throughput-deviation 0.100
```

Example 2

The following example shows output from the **show gprs gtp status** command for activated 2 PPP PDP contexts using the canonical QoS method. Both of the PDP contexts are using the premium QoS class, indicated by the `qos_high_pdp` output field:

```
Router# show gprs gtp status
GPRS GTP Status:
  gsn_used_bandwidth      14798  total_gsn_resource      1048576
  activated_pdp            2     ntwk_init_pdp           0
  activated_ppp_pdp        2
  mean_throughput_premium  2220.000
  mean_throughput_normal  0.000  mean_throughput_besteffort 0.000
  qos_high_pdp            2     qos_normal_pdp          0
  qos_low_pdp             0     qos_premium_mean-throughput-deviation 0.100
```



Note

All output fields except those related to PDP context creation appear only when canonical QoS is enabled on the GGSN.

Example 3

The following example shows output from the **show gprs gtp status** command for 3 activated PPP regenerated PDP contexts not using either the canonical or delay QoS method:

```
Router# show gprs gtp status
GPRS GTP Status:
  activated_pdp            3     ntwk_init_pdp           0
  activated_ppp_pdp        0     activated_ppp_regen_pdp  3
```

Example 4

The following example shows output from the **show gprs gtp status** command for 4 activated PDP contexts using the delay QoS method. The PDP contexts are using the delay class 1, delay class 2, and delay best effort class:

```
Router# show gprs gtp status
GPRS GTP Status:
  activated_pdp            4     ntwk_init_pdp           0
  activated_ppp_pdp        0     activated_ppp_regen_pdp  0
  qos_delay1_pdp          1     qos_delay2_pdp          1
  qos_delay3_pdp          0     qos_delaybesteffort_pdp  2
```

Example 5

The following example shows output from the **show gprs gtp status** command with 2 active PDP contexts using GTP version 1, and 5 active mobile stations:

```

router# show gprs gtp status
GPRS GTP Status:
activated_pdp                2          ntwk_init_pdp                0
activated_ppp_pdp            0
activated_gtpv0_pdp          0
activated_gtpv1_pdp          2
activated_ms                  5

```

Table 21 describes the fields shown in the display.

Table 21 *show gprs gtp status Field Descriptions*

Field	Description
activated_gtpv0_pdp	Number of PDP contexts created with GTP version 0.
activated_gtpv1_pdp	Number of PDP contexts created with GTP version 1.
activated_ms	Number of active mobile stations (MS).
activated_pdp	Number of PDP contexts currently activated. This number includes PDP contexts initiated by both the MS and the network (PDN).
activated_ppp_pdp	Number of point-to-point protocol PDP contexts currently activated.
activated_ppp_regen_pdp	Number of point-to-point protocol PDP contexts created on the GGSN.
gsn_used_bandwidth	Currently used bandwidth, in bits per second. Represents the cumulative bandwidth for all active PDP context requests currently using canonical QoS. This field only appears when canonical QoS is enabled.
mean_throughput_besteffort	Total mean throughput for best effort QoS users, in bits per second. Represents the cumulative throughput for all active PDP context requests classified in the best effort canonical QoS class. This field only appears when canonical QoS is enabled.
mean_throughput_normal	Total mean throughput for normal QoS users, in bits per second. Represents the cumulative throughput for all active PDP context requests classified in the normal canonical QoS class. This field only appears when canonical QoS is enabled.
mean_throughput_premium	Total mean throughput for premium QoS users, in bits per second. Represents the cumulative throughput for all active PDP context requests classified in the premium canonical QoS class. This field only appears when canonical QoS is enabled.
ntwk_init_pdp	Current number of active PDP contexts that are initiated by the network to an MS.
qos_delay1_pdp	Current number of active PDP contexts that are classified in the class 1 delay QoS class. This field only appears when delay QoS is enabled.
qos_delay2_pdp	Current number of active PDP contexts that are classified in the class 2 delay QoS class. This field only appears when delay QoS is enabled.

Table 21 *show gprs gtp status Field Descriptions*

Field	Description
qos_delay3_pdp	Current number of active PDP contexts that are classified in the class 3 delay QoS class. This field only appears when delay QoS is enabled.
qos_delaybesteffort_pdp	Current number of active PDP contexts that are classified in the best effort delay QoS class. This field only appears when delay QoS is enabled.
qos_high_pdp	Current number of active PDP contexts that are classified in the premium canonical QoS class. This field only appears when canonical QoS is enabled.
qos_low_pdp	Current number of PDP contexts that are classified in the best effort canonical QoS class. This field only appears when canonical QoS is enabled.
qos_normal_pdp	Current number of PDP contexts that are classified in the normal canonical QoS class. This field only appears when canonical QoS is enabled.
qos premium mean-throughput-deviation	Current mean throughput deviation for QoS. This field only appears when canonical QoS is enabled.
total gsn_resource	Currently available GSN resources. This field only appears when canonical QoS is enabled.

Related Commands

Command	Description
encapsulation gtp	Sets the encapsulation type for all connections established using the virtual template to GTP. This is mandatory for all GTP interfaces.
show gprs gtp statistics	Displays the current GTP statistics for the GGSN.

show gprs gtp-director pending-request



Note

This feature is not supported in GGSN Release 4.0.

To display a list of the create PDP context requests sent by GDM to a real GGSN that are pending expiration of the retry timer, use the **show gprs gtp-director pending-request** privileged EXEC command.

```
show gprs gtp-director pending-request {tid hex-data | all}
```

Syntax Description

tid <i>hex-data</i>	Displays the create PDP context currently requested by GDM for the specified tunnel ID. Enter the TID in hexadecimal format.
all	Displays a list of all create PDP contexts currently requested by GDM.

Defaults

No default behavior or values.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **show gprs gtp-director pending-request** command to display a list of the create PDP context requests currently sent by GDM to a real GGSN that are pending expiration of the retry timer.



Note

The **show gprs gtp-director pending-request** command shows only those PDP contexts that have been *requested* by GDM for a real GGSN—it does not represent the number of PDP contexts that are currently *active* with that GGSN.

The create PDP context requests that have been sent will continue to appear in the GDM output display until the GTP director retry timeout period has expired. You can configure the GTP director retry timeout period using the **gprs gtp-director retry-timeout** command.

Examples

Example 1

The following is sample output of the **show gprs gtp-director pending-request tid** command. The output shows that GDM has sent a create PDP context request for TID 1234120000000000 to the real GGSN with IP address 10.41.41.1 for a real APN called corporateb.com.

GDM received the original create PDP context request from the SGSN with IP address 10.23.23.1, for an APN called corporate. The corporate APN is a virtual APN that is configured at the HLR and at the DNS server used by the SGSN. The DNS server used by the SGSN should return the IP address of the GDM router for the virtual APN name.

Notice that corporateb.com appears under the output field called Domain-Name, which represents the domain portion of the username. The username (with format login@domain) is specified in the protocol configuration option (PCO) of the original create PDP context request from the SGSN. The domain name becomes the APN that GDM specifies in its create PDP context request sent to the real GGSN. In this case, GDM has sent a create PDP context request for TID 1234120000000000 to GGSN 10.41.41.1 for the corporateb.com APN:

```
router# show gprs gtp-director pending-request tid 1234120000000000
TID          GGSN-ADDR    SGSN-ADDR    APN-NAME      DOMAIN-NAME
1234120000000000  10.41.41.1  10.23.23.1  corporate     corporateb.com
```

Example 2

The following is sample output of the **show gprs gtp-director pending-request all** command:

```
router# show gprs gtp-director pending-request all
TID          GGSN-ADDR    SGSN-ADDR    APN-NAME      DOMAIN-NAME
1234000000000000  10.41.41.1  10.23.23.1  corporate     corporatea.com
1234120000000000  10.41.41.1  10.23.23.1  corporate     corporateb.com
8808000000000000  10.41.41.1  10.23.23.1  corporate     corporattec.com
```

Example 3

The following is sample output of the **show gprs gtp-director pending-request tid** command, where no domain name has been provided in the PCO IE. In this case, GDM specifies corporatea.com as the APN in the create PDP context request to the GGSN at 10.41.41.1:

```
router# show gprs gtp-director pending-request tid 1111220000333000
TID          GGSN-ADDR    SGSN-ADDR    APN-NAME      DOMAIN-NAME
1111220000333000  10.41.41.1  10.23.23.1  corporatea.com  -
```

Table 22 describes the fields shown in the displays:

Table 22 show gprs gtp-director pending-request Field Descriptions

Field	Description
TID	Tunnel identifier of the PDP context request.
GGSN-ADDR	IP address of the real GGSN to which GDM has sent the create PDP context request.
SGSN-ADDR	IP address of the SGSN from which the original create PDP context request was received by GDM.

Table 22 show gprs gtp-director pending-request Field Descriptions

Field	Description
APN-NAME	<p>APN name specified in the original create PDP context request from the SGSN.</p> <p>Note In the case where a domain name is provided in the PCO information element (IE) of the create PDP context request, this APN represents a virtual APN name, which means that this APN does not correspond to a real destination network. GDM determines the real destination network by the domain requested in the PCO IE.</p>
DOMAIN-NAME	<p>Domain name specified in the username portion of the PCO. This domain is the APN of the real destination network that is requested by GDM in the create PDP context request to the real GGSN.</p> <p>Note If the Domain-Name field contains a dash, it indicates that the domain name is not provided in the PCO IE. In this case, GDM uses the value of the APN as the real destination network.</p>

Related Commands

Command	Description
gprs gtp-director retry-timeout	Specifies the amount of time during which the GTP director forwards retries from an SGSN to the selected GGSN to establish a PDP context.

show gprs gtp-director statistics

To display the current statistics for create requests received by GDM, use the **show gprs gtp-director statistics** privileged EXEC command.

show gprs gtp-director statistics

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values.

Command Modes Privileged EXEC

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW

Usage Guidelines

Use the **show gprs gtp-director statistics** command to display the current statistics for create requests received by GDM.

Most of the counter values displayed by this command represent totals accumulated since the last time the statistical counters were cleared using the **clear gprs gtp-director statistics** command. However, the counter for the number of unique PDP contexts pending retry timeout increments and decrements as the GTP director idle time-out period is reached for a forwarded PDP context.

Examples

The following is sample output of the **show gprs gtp-director statistics** command:

```
router# show gprs gtp-director statistics
      GTP-Director Statistics
Number of unique pdp-contexts forwarded:      23
Total number of create requests forwarded:    50
Total number of create requests rejected:     0
Number of unique pdp-contexts pending retry-timeout: 2
Total number of unsupported messages received: 0
Total number of requests dropped:            0
```

Table 23 describes the fields shown in the display.

Table 23 *show gprs gtp-director statistics Field Descriptions*

Field	Description
Number of unique pdp-contexts forwarded	Number of create PDP context requests with unique TIDs that GDM has forwarded to a real GGSN. This number does not include retries by the SGSN.
Total number of create requests forwarded	Total number of create PDP context requests, including retries from the SGSN, that GDM has forwarded to a real GGSN.
Total number of create requests rejected	Total number of create PDP context requests sent by the SGSN that GDM has rejected. For example, if an invalid domain name is requested, the create PDP context request is rejected.
Number of unique pdp-contexts pending retry-timeout	Number of create PDP context requests with unique TIDs, that have been forwarded by GDM to a real GGSN, whose retry timeout period has not expired. When the retry timeout period is reached, this counter is decremented. You can display the create PDP context requests that are pending retry timeout using the show gprs gtp-director pending-request command.
Total number of unsupported messages received	Total number of messages received that GDM cannot process (for example, delete PDP context requests or echo messages). Under normal conditions, this counter should not increment. If the counter is incrementing, a problem in the network is indicated. The only signaling message that GDM receives and processes is a create PDP context request.
Total number of requests dropped	Total number of create PDP context requests that were unable to be forwarded by GDM. Dropped requests indicate a routing problem between the GTP stack and the IP stack. However, this counter does not indicate problems at the IP level.

Related Commands

Command	Description
clear gprs gtp-director statistics	Clears the current GDM forwarded and rejected request counters.
gprs gtp-director retry-timeout	Specifies the amount of time during which the GTP director forwards retries from an SGSN to the selected GGSN to establish a PDP context.
show gprs gtp-director pending-request	Displays a list of the create PDP context requests sent by GDM to a real GGSN that are pending retry timeout.

show gprs ms-address exclude-range

To display the IP address range(s) configured on the GGSN for the GPRS network, use the **show gprs ms-address exclude-range** privileged EXEC command.

show gprs ms-address exclude-range

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW

Usage Guidelines Use the **show gprs ms-address exclude-range** command to display the IP address range(s) configured on the GGSN for the GPRS network.
IP addresses are 32-bit values.

Examples The following is sample output of the **show gprs ms-address exclude-range** command:

```
router# show gprs ms-address exclude-range
Start IP           End IP
10.0.0.1           10.10.10.10
```

Table 24 describes the fields shown in the display.

Table 24 *show gprs ms-address exclude-range* Field Descriptions

Field	Description
Start IP	IP address at the beginning of the range.
End IP	IP address at the end of the range.

Related Commands	Command	Description
	gprs ms-address exclude-range	Specifies the IP address range(s) used by the GPRS network and thereby excluded from the mobile station (MS) IP address range.

show gprs plmn ip address

To display the IP address range(s) configured for a PLMN, use the **show gprs plmn ip address** privileged EXEC command.

show gprs plmn ip address

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(8)YW	This command was introduced.

Usage Guidelines Use the **show gprs plmn ip address** command to display the IP address range(s) configured for a PLMN. IP addresses are 32-bit values.

Examples The following is sample output of the **show gprs plmn ip address** command:

```
router# show gprs plmn ip address
PLMN Start IP      End IP             Range Type
9.9.9.9            9.9.9.9
10.2.25.1          10.2.25.255
16.0.0.9           16.0.0.9
99.100.0.1         99.100.0.255
101.0.1.1          101.0.1.1         sgsn
105.0.1.1          105.0.1.1         sgsn
106.0.1.1          106.0.1.1         sgsn
110.12.0.2         110.12.0.2
110.13.0.2         110.13.0.2
```

Table 24 describes the fields shown in the display.

Table 25 *show gprs plmn ip address Field Descriptions*

Field	Description
PLMN Start IP	IP address at the beginning of the range.
End IP	IP address at the end of the range.
Range Type	

Related Commands

Command	Description
gprs plmn ip address	Specifies the PLMN IP address range(s) used by the GGSN.

show gprs qos status

To display the number of PDP contexts currently active on the GGSN for a particular QoS class, use the **show gprs qos status** privileged EXEC command.

show gprs qos status

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(8)YW	This command was introduced.

Usage Guidelines Use the **show gprs qos status** command to display the number of PDP contexts currently active on the GGSN for a particular QoS class.

Examples

Example 1

The following example shows output from the **show gprs qos status** command for UMTS QoS:

```
router# show gprs qos status
GPRS QoS Status:
  type:UMTS
  conversational_pdp      100  streaming_pdp      150
  interactive_pdp        1345  background_pdp     2000
```

Table 26 describes the fields shown in the display.

Table 26 show gprs qos status Field Descriptions

Field	Description
type	Type of QoS. Possible QoS types are: <ul style="list-style-type: none"> • Canonical—Configured using the gprs qos map canonical-qos command. • Delay—Configured using the gprs qos map delay command. • UMTS—Configured using the gprs qos map umts command. • None—No QoS is configured on the GGSN.
conversational_pdp	Current number of PDP contexts that have a conversational UMTS QoS traffic class.
streaming_pdp	Current number of PDP contexts that have a streaming UMTS QoS traffic class.
interactive_pdp	Current number of PDP contexts that have a interactive UMTS QoS traffic class.
background_pdp	Current number of PDP contexts that have a background UMTS QoS traffic class.

Example 2

The following example displays output from the **show gprs qos status** command for canonical QoS:

```
router# show gprs qos status
GPRS QoS Status:
type:Canonical
  gsn_used_bandwidth:1110.000      total_gsn_resource:1048576
  mean_throughput_premium:0.000
  mean_throughput_normal:1110.000  mean_throughput_besteffort 0.000
  qos_high_pdp:0                  qos_normal_pdp:1
  qos_low_pdp :0                  qos_premium_mean-throughput-deviation 0.100
```

Table 27 describes the fields shown in the display.

Table 27 show gprs qos status Field Descriptions

Field	Description
type	Type of QoS. Possible QoS types are: <ul style="list-style-type: none"> • Canonical—Configured using the gprs qos map canonical-qos command. • Delay—Configured using the gprs qos map delay command. • UMTS—Configured using the gprs qos map umts command. • None—No QoS is configured on the GGSN.
gsn_used_bandwidth	Currently used bandwidth, in bits per second.
total_gsn_resource	Currently available GSN resources.

Table 27 show gprs qos status Field Descriptions

Field	Description
mean_throughput_premium:	Total mean throughput for premium QoS users, in bytes.
mean_throughput_normal	Total mean throughput for normal QoS users, in bytes.
mean_throughput_besteffort	Total mean throughput for best effort QoS users, in bytes.
qos_high_pdp	Current number of PDP contexts that have a high QoS.
qos_normal_pdp	Current number of PDP contexts that have a normal QoS.
qos_low_pdp	Current number of PDP contexts that have a low QoS.
qos_premium mean-throughput-deviation	Current mean throughput deviation for QoS.

Example 3

The following example displays output from the **show gprs qos status** command for delay QoS:

```
router# show gprs qos status
GPRS QoS Status:
type:Delay
qos_delay1_pdp:0          qos_delay2_pdp: 0
qos_delay3_pdp:0          qos_delaybesteffort_pdp  0
```

Table 28 describes the fields shown in the display.

Table 28 show gprs qos status Field Descriptions

Field	Description
type	Type of QoS. Possible QoS types are: <ul style="list-style-type: none"> • Canonical—Configured using the gprs qos map canonical-qos command. • Delay—Configured using the gprs qos map delay command. • UMTS—Configured using the gprs qos map umts command. • None—No QoS is configured on the GGSN.
qos_delay1_pdp	Current number of PDP contexts that have a delay1 QoS class.
qos_delay2_pdp	Current number of PDP contexts that have a delay2 QoS class.
qos_delay3_pdp	Current number of PDP contexts that have a delay3 QoS class.
qos_delaybesteffort_pdp	Current number of PDP contexts that have a delaybesteffort_pdp QoS class.

Example 4

The following example shows output from the **show gprs qos status** command when no QoS has been configured on the GGSN:

```
router# show gprs qos status
GPRS QoS Status:
type:None
```

Related Commands

Command	Description
gprs qos map canonical-qos	Enables mapping of GPRS QoS categories to a canonical QoS method that includes best-effort, normal, and premium QoS classes.
gprs qos map delay	Enables Delay QoS on the GGSN.
gprs qos map umts	Enables UMTS QoS on the GGSN.

show gprs umts-qos map traffic-class

To display UMTS QoS mapping information, use the **show gprs umts-qos map traffic-class** privileged EXEC command.

```
show gprs umts-qos map traffic-class {all | signalling | conversational | streaming | interactive | background}
```

Syntax Description	all	Displays information for all UMTS QoS traffic classes.
	signalling	Displays information for the UMTS QoS traffic class signalling.
	conversational	Displays information for the UMTS QoS traffic class conversational.
	streaming	Displays information for the UMTS QoS traffic class streaming.
	interactive	Displays information for the UMTS QoS traffic class interactive.
	background	Displays information for the UMTS QoS traffic class background.

Defaults No default behavior or values.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(8)YW	This command was introduced.

Usage Guidelines Use the **show gprs umts-qos map traffic-class** command to display information about UMTS QoS mapping.

Examples The following example shows output from the **show gprs umts-qos map traffic-class** command for all UMTS QoS traffic classes:

```
router# show gprs umts-qos map traffic-class all
Traffic Class      Diffserv PHB Group      Diffserv Code Point
signaling          Signaling Class         40
conversational     EF Class                 46
streaming          AF2 Class                18,20,22
interactive        AF3 Class                26,28,30
background         Best Effort              0
```

Table 29 describes the fields shown in the display.

Table 29 show gprs umts-qos map traffic-class Field Descriptions

Field	Description
Traffic Class	Type of UMTS QoS traffic class as specified in the gprs umts-qos map traffic-class command. The UMTS QoS traffic classes are: <ul style="list-style-type: none"> • signaling • conversational • streaming • interactive • background
Diffserv PHB Group	Type of DiffServ PHB group as specified in the gprs umts-qos map diffserv-phb command. Possible DiffServ PHB groups are: <ul style="list-style-type: none"> • signalling-class • ef-class • af1-class • af2-class • af3-class • af4-class • best-effort
Diffserv Code Point	Number of DSCPs as specified in the gprs umts-qos map diffserv-phb command.

Related Commands

Command	Description
gprs umts-qos map traffic-class	Specifies a QoS mapping from the UMTS traffic classes to a differentiated services (DiffServ) per-hop behavior (PHB) group
gprs umts-qos map diffserv-phb	Assigns a differentiated services code point (DSCP) to a DiffServ PHB group.

subscription-required

To specify that the GGSN checks the value of the selection mode in a PDP context request to determine if a subscription is required to access a PDN through a particular access point, use the **subscription-required** access-point configuration command. To specify that no subscription is required, use the **no** form of this command.

subscription-required

no subscription-required

Syntax Description This command has no arguments or keywords.

Defaults No subscription is required

Command Modes Access-point configuration.

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

Use the **subscription-required** command to specify that the GGSN checks the value of the selection mode in a PDP context request to determine if a subscription is required for user access to PDNs through the current access point. When you configure the **subscription-required** command at the APN, the GGSN looks for the “subscription verified” selection mode in the PDP context request to establish the session. If the GGSN finds that the selection mode is designated as subscription not verified in the PDP context request, then the GGSN rejects the PDP context request.

The subscription must be set up by the service provider, and subscription information must be passed with the mobile user’s PDP context requests.

Examples

The following example specifies that the GGSN checks for subscription verification in the selection mode before establishing a session at the access-point:

```
access-point 1
 access-point-name gprs.somewhere.com
 dhcp-server 10.100.0.3
 dhcp-gateway-address 10.88.0.1
 subscription-required
 exit
```

vrf

To configure VPN routing and forwarding at a GGSN access point and associate the access point with a particular VRF instance, use the **vrf** access-point configuration command.

vrf *vrf-name*

Syntax Description

<i>vrf-name</i>	Name of the corresponding VRF instance with which the access point is associated.
-----------------	---

Defaults

No default behavior or values.

Command Modes

Access-point configuration

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW

Usage Guidelines

Use the **vrf** command to configure VPN routing and forwarding (VRF) at a GGSN access point and associate the access point with a particular VRF instance. The *vrf-name* should match the name configured in an **ip vrf** global configuration command, and also the **ip vrf forwarding** command at the Gi interface.

To support VRF, you must also enable Cisco Express Forwarding (CEF) switching on the router using the **ip cef** global configuration command.

If you are also configuring DHCP services at the APN, then you must also configure the **dhcp-server ip-address vrf** command.



Note

Memory constraints might occur if you define a large number of access points to support VPN Routing and Forwarding (VRF).

Examples

The following example shows a VRF configuration for vpn3 (without tunneling) using the **ip vrf** global configuration command. Because the **ip vrf** command establishes both VRF and CEF routing tables, notice that **ip cef** also is configured at the global configuration level to enable CEF switching at all of the interfaces.

The following other configuration elements must also associate the same VRF named vpn3:

- FastEthernet0/0 is configured as the Gi interface using the **ip vrf forwarding** interface configuration command.
- Access-point 2 implements VRF using the **vrf** command access-point configuration command.

The DHCP server at access-point 2 also is configured to support VRF. Notice that access-point 1 uses the same DHCP server, but is not supporting the VRF address space. The IP addresses for access-point 1 will apply to the global routing table:

```

aaa new-model
!
aaa group server radius foo
  server 10.2.3.4
  server 10.6.7.8
!
aaa authentication ppp foo group foo
aaa authorization network default group radius
aaa accounting exec default start-stop group foo
!
ip cef
!
ip vrf vpn3
  rd 300:3
!
interface Loopback1
  ip address 10.30.30.30 255.255.255.255
!
interface Loopback2
  ip vrf forwarding vpn3
  ip address 10.27.27.27 255.255.255.255
!
interface FastEthernet0/0
  ip vrf forwarding vpn3
  ip address 10.50.0.1 255.255.0.0
  duplex half
!
interface FastEthernet1/0
  ip address 10.70.0.1 255.255.0.0
  duplex half
!
interface loopback 1
  ip address 10.8.0.1 255.255.255.0
!
interface Virtual-Template1
  ip unnumber loopback 1
  encapsulation gtp
  gprs access-point-list gprs
!
ip route 10.10.0.1 255.255.255.255 Virtual-Template1
ip route vrf vpn3 10.100.0.5 255.255.255.0 fa0/0 10.50.0.2
ip route 10.200.0.5 255.255.255.0 fa1/0 10.70.0.2
!
no ip http server
!
gprs access-point-list gprs
  access-point 1
    access-point-name gprs.pdn.com
    ip-address-pool dhcp-proxy-client
    dhcp-server 10.200.0.5
    dhcp-gateway-address 10.30.30.30
    network-request-activation
    exit
  !
  access-point 2
    access-point-name gprs.pdn2.com
    access-mode non-transparent
    ip-address-pool dhcp-proxy-client
    dhcp-server 10.100.0.5 10.100.0.6 vrf
    dhcp-gateway-address 10.27.27.27

```

```

aaa-group authentication foo
vrf vpn3
exit
!
gprs default ip-address-pool dhcp-proxy-client
gprs gtp ip udp ignore checksum
!
radius-server host 10.2.3.4 auth-port 1645 acct-port 1646 non-standard
radius-server host 10.6.7.8 auth-port 1645 acct-port 1646 non-standard
radius-server key ggsntel

```

Related Commands

Command	Description
dhcp-server	Specifies a primary (and backup) DHCP server to allocate IP addresses to MS users entering a particular PDN access point.
ip cef	Enables CEF on the RP card.
ip vrf	Configures a VRF routing table.
ip vrf forwarding	Associates a VRF with an interface or subinterface.
rd	Creates routing and forwarding tables for a VRF and and specifies the default route distinguisher for a VPN.



Mobile Wireless Commands by Technology





Cisco IOS GGSN Command Set

GPRS is a new service designed for Global System for Mobile Communications (GSM) networks. This chapter provides a reference list for all of the GPRS Gateway Support Node (GGSN) commands in the Cisco IOS software that are documented in this book.

For GGSN configuration tasks and examples, refer to the *Cisco IOS Mobile Wireless Configuration Guide*.

The following GPRS GGSN commands are documented in this book:

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- aaa-group, page 5
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- access-point, page 11
- access-point-name, page 13
- access-type, page 14
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- gprs umts-qos map traffic-class, page 162
- gprs slb cef, page 157
- gprs umts-qos dscp unmodified, page 159
- gprs umts-qos map diffserv-phb, page 160
- gprs umts-qos map traffic-class, page 162
- gtp response-message wait-accounting, page 164

- ip-access-group, page 167
- ip-address-pool, page 169
- msisdn suppression, page 172
- network-request-activation, page 174
- ppp-regeneration, page 175
- radius attribute suppress imsi, page 177
- radius attribute suppress qos, page 178
- radius attribute suppress sgsn-address, page 179
- redirect intermobile ip, page 180
- security verify, page 181
- service gprs ggsn, page 183
- session idle-time, page 185
- show gprs access-point, page 193
- show gprs access-point statistics, page 202
- show gprs charging parameters, page 205
- show gprs charging statistics, page 211
- show gprs charging status, page 213
- show gprs gtp ms, page 216
- show gprs gtp parameters, page 219
- show gprs gtp path, page 222
- show gprs gtp pdp-context, page 224
- show gprs gtp statistics, page 235
- show gprs gtp status, page 239
- show gprs ms-address exclude-range, page 248
- show gprs qos status, page 251
- show gprs umts-qos map traffic-class, page 255
- show gprs plmn ip address, page 249
- show gprs qos status, page 251
- show gprs umts-qos map traffic-class, page 255
- subscription-required, page 257
- vrf, page 258

Replaced Commands

Table 44 shows a list of GGSN Release 3.0 commands that have been replaced with new syntax as of Cisco IOS Release 12.2(8)YD:

Table 44 *GGSN Commands with New Syntax*

Old Command Syntax	New Command Syntax
block-roamer	block-foreign-ms
gprs charging qos-info	gprs charging release
access-violation	access-violation deactivate-pdp-context

Obsolete Commands

The following commands are no longer supported in GGSN Release 3.0 as of Cisco IOS Release 12.2(8)YD:

- **gprs hplmn matching-criteria pcs1900**



Cisco IOS GDM Command Set

The Cisco IOS GTP Director Module (GDM) provides virtual APN and server load balancing services to non-Cisco GGSNs in a GPRS network. This chapter provides a reference list for all of the GDM commands in the Cisco IOS software that are documented in this book.

For GDM configuration tasks and examples, refer to the *Cisco IOS Mobile Wireless Configuration Guide*.



Note

The **encapsulation gtp** command is used in both GGSN and GTP director configuration under the virtual template interface. However, a router cannot be configured to support both GGSN and GTP director services at the same time.

The following GDM commands are documented in this book:

- `clear gprs gtp-director statistics`, page 30
- `debug gprs gtp-director`, page 309
- `debug gprs gtp parsing`, page 315
- `encapsulation gtp`, page 37
- `gprs gtp-director retry-timeout`, page 108
- `service gprs gtp-director`, page 184
- `show gprs gtp-director pending-request`, page 243
- `show gprs gtp-director statistics`, page 246





Appendix





Debug Commands

The commands in this section are for troubleshooting the GGSN. For information about other debug commands, see the *Cisco IOS Debug Command Reference*.

This chapter contains the following command:

- `debug gprs dfp`, page 304
- `debug gprs dhcp`, page 305
- `debug gprs gtp`, page 307
- `debug gprs gtp-director`, page 309
- `debug gprs gtp parsing`, page 315
- `debug gprs gtp ppp`, page 316
- `debug gprs gtp ppp-regeneration`, page 318
- `debug gprs radius`, page 322

debug gprs dfp

To display debug messages for GPRS DFP weight calculation, use the **debug gprs dfp** privileged EXEC command. To disable debugging output, use the **no** form of this command.

debug gprs dfp

no debug gprs dfp

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values.

Command History	Release	Modification
	12.1(9)E	This command was introduced.
	12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines See the following caution before using **debug** commands:



Caution

Because debugging output is assigned high priority in the CPU process, it can render the system unusable. For this reason, use **debug** commands only to troubleshoot specific problems or during troubleshooting sessions with Cisco technical support staff. Moreover, it is best to use **debug** commands during periods of lower network flows and fewer users. Debugging during these periods reduces the effect these commands have on other users on the system.

This command displays debug messages for GPRS DFP weight calculation. To display debug messages for the DFP agent subsystem, use the **debug ip dfp agent** command.

Examples The following example configures a debug session to check all GPRS DFP weight calculation:

```
Router# debug gprs dfp
GPRS DFP debugging is on
Router#
```

The following example stops all debugging:

```
Router# no debug all
All possible debugging has been turned off
Router#
```

debug gprs dhcp

To display information about Dynamic Host Configuration Protocol (DHCP) processing on the GGSN, use the **debug gprs dhcp** privileged EXEC command. To disable debugging output, use the **no** form of this command.

debug gprs dhcp

no debug gprs dhcp

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values.

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

This command is useful for system operators and development engineers if problems are encountered with DHCP processing on the GGSN. To display standard debug messages between the DHCP client on the router and a DHCP server, you can also use the **debug dhcp** or **debug dhcp detail** commands with the **debug gprs dhcp** command.



Caution

Because the **debug gprs dhcp** command generates a significant amount of output, use it only when traffic on the GPRS network is low, so other activity on the system is not adversely affected.

Examples

The following example shows sample output for DHCP processing on the GGSN:

```
Router# debug gprs dhcp
2d13h: GPRS:DHCP req:TID 1111111100000099, Req 1
2d13h: GPRS:Requesting IP address for pdp 1111111100000099 from server 172.16.0.8 tableid
0
2d13h: GPRS:DHCP ip allocation pass (10.88.17.43) for pdp 1111111100000099
2d13h: GPRS:Using DHCP ip address 10.88.17.43 for pdp 1111111100000099
```

The following example shows sample output for standard debug messaging for DHCP processing on the router between the DHCP client and a DHCP server:

```
2d13h: DHCP: proxy allocate request
2d13h: DHCP: new entry. add to queue
2d13h: DHCP: SDiscover attempt # 1 for entry:
2d13h: DHCP: SDiscover: sending 283 byte length DHCP packet
2d13h: DHCP: SDiscover with directed serv 172.16.0.8, 283 bytes
2d13h: DHCP: XID MATCH in dhcpc_for_us()
2d13h: DHCP: Received a BOOTREP pkt
2d13h: DHCP: offer received from 172.16.0.8
```

■ debug gprs dhcp

```
2d13h: DHCP: SRequest attempt # 1 for entry:
2d13h: DHCP: SRequest- Server ID option: 172.16.0.8
2d13h: DHCP: SRequest- Requested IP addr option: 10.88.17.43
2d13h: DHCP: SRequest placed lease len option: 604800
2d13h: DHCP: SRequest: 301 bytes
2d13h: DHCP: SRequest: 301 bytes
2d13h: DHCP: XID MATCH in dhcpc_for_us()
2d13h: DHCP: Received a BOOTREP pkt
2d13h: DHCP Proxy Client Pooling: ***Allocated IP address: 10.88.17.43
```

Related Commands

Command	Description
debug dhcp	Displays debug messages between the DHCP client on the router and a DHCP server.

debug gprs gtp

To display information about the GPRS Tunneling Protocol (GTP), use the **debug gprs gtp** privileged EXEC command. To disable debugging output, use the **no** form of this command.

```
debug gprs gtp { events | messages | packets | ppp { details | events } }
```

```
no debug gprs gtp { events | messages | packets | ppp { details | events } }
```

Syntax Description

events	Displays events related to GTP processing on the GGSN.
messages	Displays GTP signaling messages that are sent between the SGSN and GGSN.
packets	Displays GTP packets that are sent between the SGSN and GGSN.
ppp { details events }	Displays GTP PPP packets that are sent between the SGSN and GGSN. The details keyword generates more extensive debug output. The events keyword generates output specific to certain conditions that are occurring, which helps qualify the output being received using the details option.

Defaults

No default behavior or values.

Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(5)T	This command was integrated in Cisco IOS Release 12.1(5)T.
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX, and the ppp { details events } option was added.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

This command is useful for system operators and development engineers if problems are encountered with communication between the GGSN and the SGSN using GTP.



Caution

Because the **debug gprs gtp** command generates a significant amount of output, use it only when traffic on the GPRS network is low, so other activity on the system is not adversely affected.

Examples

The following example enables the display of events related to GTP processing on the GGSN:

```
Router# debug gprs gtp events
```

The following example enables the display of GTP signaling messages:

```
Router# debug gprs gtp messages
```

The following example enables the display of GTP packets sent between the SGSN and GGSN:

```
Router# debug gprs gtp packets
```

The following example enables the display of GTP PPP events between the SGSN and GGSN:

```
Router# debug gprs gtp ppp events
```

The following example enables the display of detailed GTP PPP debug output along with GTP PPP events between the SGSN and GGSN:

```
Router# debug gprs gtp ppp details
```

```
Router# debug gprs gtp ppp events
```

debug gprs gtp-director

To display information about the GTP Director Module (GDM), use the **debug gprs gtp-director** privileged EXEC command. To disable debugging output, use the **no** form of this command.

debug gprs gtp-director {events | packets}

no debug gprs gtp-director {events | packets}

Syntax Description

events	Displays events related to GDM processing.
packets	Displays packets that are sent between GDM and a GGSN.

Defaults

No default behavior or values.

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

This command is useful for system operators and development engineers if problems are encountered with communication between GDM and an SGSN, or between GDM and a GGSN.



Caution

Because the **debug gprs gtp-director** command generates a significant amount of output, use it only when traffic on the GPRS network is low, so other activity on the system is not adversely affected.

Examples

The following debug examples provide sample output for a create PDP context request, delete PDP context request, and clear PDP context using PPP regeneration on the GGSN. The first three examples show output related to debug events messaging only. The last three examples show output while both debug events and details are enabled on the GGSN.

Example 1

The following example displays events related to PPP regeneration processing for a create PDP context requested received by the GGSN:

```
Router# debug gprs gtp-director events
*Mar 1 00:02:42.787: GPRS:1111110000000000:Authen: PAP username: user@pdn.com
*Mar 1 00:02:42.787: GPRS:1111110000000000:Processing Initiate PPP regen from reqQ
*Mar 1 00:02:42.787: GPRS:1111110000000000:got event [REQUEST PPP REGEN] in state [IDLE]
*Mar 1 00:02:42.787: GPRS:1111110000000000:state [IDLE->AUTHORIZING] on event [REQUEST
PPP REGEN]
*Mar 1 00:02:42.787: GPRS:1111110000000000:Got VPN authorization info
*Mar 1 00:02:42.787: GPRS:1111110000000000:got event [AUTHOR SUCCESS] in state
[AUTHORIZING]
*Mar 1 00:02:42.787: GPRS:1111110000000000:state [AUTHORIZING->VPDN CONNECTING] on event
[AUTHOR SUCCESS]
```

```

*Mar 1 00:02:42.787: GPRS:1111110000000000:Author succeeded, establishing the tunnel
*Mar 1 00:02:42.787: GPRS:1111110000000000:Create/Clone vaccess to negotiate PPP
*Mar 1 00:02:42.791: GPRS:1111110000000000:MS no static IP addr. Get one via IPCP
*Mar 1 00:02:42.827: GPRS:1111110000000000:VPDN to inform PPP regen: CONNECTED
*Mar 1 00:02:42.827: GPRS:1111110000000000:got event [VPDN CONNECTED] in state [VPDN
CONNECTING]
*Mar 1 00:02:42.827: GPRS:1111110000000000:state [VPDN CONNECTING->PPP NEGOTIATING] on
event [VPDN CONNECTED]
*Mar 1 00:02:42.827: GPRS:1111110000000000:Start PPP negotiations on vaccess
*Mar 1 00:02:42.831: %LINK-3-UPDOWN: Interface Virtual-Access3, changed state to up
*Mar 1 00:02:42.835: GPRS:1111110000000000:IPCP is up
*Mar 1 00:02:42.835: GPRS:1111110000000000:IP addr 10.10.1.187 is negotiated for MS
*Mar 1 00:02:42.835: GPRS:1111110000000000:DNS - Primary: 10.3.0.1 Secondary: 0.0.0.0
NetBios - Primary: 0.0.0.0, Secondary: 0.0.0.0
*Mar 1 00:02:42.835: GPRS:1111110000000000:PPP connected
*Mar 1 00:02:42.835: GPRS:1111110000000000:got event [PPP NEGOTIATED] in state [PPP
NEGOTIATING]
*Mar 1 00:02:42.835: GPRS:1111110000000000:state [PPP NEGOTIATING->PPP CONNECTED] on
event [PPP NEGOTIATED]
*Mar 1 00:02:42.835: GPRS:1111110000000000:PPP succeeded negotiation, session established
*Mar 1 00:02:43.835: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access3,
changed state to up

```

Example 2

The following example displays events related to PPP regeneration processing for a delete PDP context requested received by the GGSN:

```

Router# debug gprs gtp-director events
*Mar 1 00:03:18.331: GPRS:1111110000000000:GTP disconnecting the PPP regen session
*Mar 1 00:03:18.331: GPRS:1111110000000000:Processing Disconnect PPP regen from reqQ
*Mar 1 00:03:18.331: GPRS:1111110000000000:got event [CANCEL REGEN'ED PPP] in state [PPP
CONNECTED]
*Mar 1 00:03:18.331: GPRS:1111110000000000:state [PPP CONNECTED->PPP TERMINATING] on
event [CANCEL REGEN'ED PPP]
*Mar 1 00:03:18.331: GPRS:1111110000000000:Cancel request after VPND tunnel is up
*Mar 1 00:03:18.335: GPRS:1111110000000000:PPP down
*Mar 1 00:03:18.335: GPRS:1111110000000000:got event [PPP FAILED] in state [PPP
TERMINATING]
*Mar 1 00:03:18.339: GPRS:1111110000000000:state [PPP TERMINATING->IDLE] on event [PPP
FAILED]
*Mar 1 00:03:18.339: GPRS:1111110000000000:PPP failed negotiation
*Mar 1 00:03:18.339: GPRS:1111110000000000:got event [CLEANUP CONTEXT] in state [IDLE]
*Mar 1 00:03:18.339: GPRS:1111110000000000:VPDN to inform PPP regen: DISCONNECTED
*Mar 1 00:03:18.339: GPRS:1111110000000000:got event [VPDN DISCONNECTED] in state [IDLE]
*Mar 1 00:03:18.339: GPRS:1111110000000000:state [IDLE->IDLE] on event [CLEANUP CONTEXT]
*Mar 1 00:03:18.339: GPRS:1111110000000000:Freeing context structure
*Mar 1 00:03:18.339: %LINK-3-UPDOWN: Interface Virtual-Access3, changed state to down
*Mar 1 00:03:19.331: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access3,
changed state to down

```

Example 3

The following example displays events related to PPP regeneration processing as the GGSN clears a PDP context request:

```

Router# debug gprs gtp-director events
*Mar 1 00:04:50.083: GPRS:1111110000000000:GTP disconnecting the PPP regen session
*Mar 1 00:04:50.083: GPRS:1111110000000000:Processing Disconnect PPP regen from reqQ
*Mar 1 00:04:50.083: GPRS:1111110000000000:got event [CANCEL REGEN'ED PPP] in state [PPP
CONNECTED]
*Mar 1 00:04:50.083: GPRS:1111110000000000:state [PPP CONNECTED->PPP TERMINATING] on
event [CANCEL REGEN'ED PPP]
*Mar 1 00:04:50.083: GPRS:1111110000000000:Cancel request after VPND tunnel is up

```

```

*Mar 1 00:04:50.087: GPRS:1111110000000000:PPP down
*Mar 1 00:04:50.087: GPRS:1111110000000000:got event [PPP FAILED] in state [PPP
TERMINATING]
*Mar 1 00:04:50.091: GPRS:1111110000000000:state [PPP TERMINATING->IDLE] on event [PPP
FAILED]
*Mar 1 00:04:50.091: GPRS:1111110000000000:PPP failed negotiation
*Mar 1 00:04:50.091: GPRS:1111110000000000:got event [CLEANUP CONTEXT] in state [IDLE]
*Mar 1 00:04:50.091: GPRS:1111110000000000:VPDN to inform PPP regen: DISCONNECTED
*Mar 1 00:04:50.091: GPRS:1111110000000000:got event [VPDN DISCONNECTED] in state [IDLE]
*Mar 1 00:04:50.091: GPRS:1111110000000000:state [IDLE->IDLE] on event [CLEANUP CONTEXT]
*Mar 1 00:04:50.091: GPRS:1111110000000000:Freeing context structure
*Mar 1 00:04:50.091: %LINK-3-UPDOWN: Interface Virtual-Access4, changed state to down
*Mar 1 00:04:51.083: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access4,
changed state to down

```

Example 4

The following example displays both debug events and details related to PPP regeneration processing for a create PDP context requested received by the GGSN:

```

Router# debug gprs gtp-director events
Router# debug gprs gtp-director details
*Mar 1 00:05:21.083: PPP-REGEN state counters: pending counter is 0
*Mar 1 00:05:21.083: State[IDLE] counter is 0
*Mar 1 00:05:21.083: State[AUTHORIZING] counter is 0
*Mar 1 00:05:21.083: State[VPDN CONNECTING] counter is 0
*Mar 1 00:05:21.083: State[PPP NEGOTIATING] counter is 0
*Mar 1 00:05:21.083: State[PPP CONNECTED] counter is 0
*Mar 1 00:05:21.083: State[PPP TERMINATING] counter is 0
*Mar 1 00:05:21.087: PPP-REGEN state counters: pending counter is 1
*Mar 1 00:05:21.087: State[IDLE] counter is 1
*Mar 1 00:05:21.087: State[AUTHORIZING] counter is 0
*Mar 1 00:05:21.087: State[VPDN CONNECTING] counter is 0
*Mar 1 00:05:21.087: State[PPP NEGOTIATING] counter is 0
*Mar 1 00:05:21.087: State[PPP CONNECTED] counter is 0
*Mar 1 00:05:21.087: State[PPP TERMINATING] counter is 0
*Mar 1 00:05:21.087: GPRS:1111110000000000:Authen: PAP username: user@pdn.com
*Mar 1 00:05:21.087: GPRS:1111110000000000:Session timer started
*Mar 1 00:05:21.087: GPRS:1111110000000000:Processing Initiate PPP regen from reqQ
*Mar 1 00:05:21.087: GPRS:1111110000000000:got event [REQUEST PPP REGEN] in state [IDLE]
*Mar 1 00:05:21.087: PPP-REGEN state counters: pending counter is 1
*Mar 1 00:05:21.087: State[IDLE] counter is 0
*Mar 1 00:05:21.087: State[AUTHORIZING] counter is 1
*Mar 1 00:05:21.087: State[VPDN CONNECTING] counter is 0
*Mar 1 00:05:21.087: State[PPP NEGOTIATING] counter is 0
*Mar 1 00:05:21.087: State[PPP CONNECTED] counter is 0
*Mar 1 00:05:21.087: State[PPP TERMINATING] counter is 0
*Mar 1 00:05:21.087: GPRS:1111110000000000:state [IDLE->AUTHORIZING] on event [REQUEST
PPP REGEN]
*Mar 1 00:05:21.087: GPRS:1111110000000000:Got VPN authorization info
*Mar 1 00:05:21.087: GPRS:1111110000000000:got event [AUTHOR SUCCESS] in state
[AUTHORIZING]
*Mar 1 00:05:21.087: PPP-REGEN state counters: pending counter is 1
*Mar 1 00:05:21.087: State[IDLE] counter is 0
*Mar 1 00:05:21.087: State[AUTHORIZING] counter is 0
*Mar 1 00:05:21.087: State[VPDN CONNECTING] counter is 1
*Mar 1 00:05:21.087: State[PPP NEGOTIATING] counter is 0
*Mar 1 00:05:21.087: State[PPP CONNECTED] counter is 0
*Mar 1 00:05:21.087: State[PPP TERMINATING] counter is 0
*Mar 1 00:05:21.087: GPRS:1111110000000000:state [AUTHORIZING->VPDN CONNECTING] on event
[AUTHOR SUCCESS]
*Mar 1 00:05:21.087: GPRS:1111110000000000:Author succeeded, establishing the tunnel
*Mar 1 00:05:21.087: GPRS:1111110000000000:Create/Clone vaccess to negotiate PPP
*Mar 1 00:05:21.091: GPRS:1111110000000000:MS no static IP addr. Get one via IPCP

```

```

*Mar 1 00:05:21.127: GPRS:1111110000000000:VPDN to inform PPP regen: CONNECTED
*Mar 1 00:05:21.127: GPRS:1111110000000000:got event [VPDN CONNECTED] in state [VPDN
CONNECTING]
*Mar 1 00:05:21.127: PPP-REGEN state counters: pending counter is 1
*Mar 1 00:05:21.127: State[IDLE] counter is 0
*Mar 1 00:05:21.127: State[AUTHORIZING] counter is 0
*Mar 1 00:05:21.127: State[VPDN CONNECTING] counter is 0
*Mar 1 00:05:21.127: State[PPP NEGOTIATING] counter is 1
*Mar 1 00:05:21.127: State[PPP CONNECTED] counter is 0
*Mar 1 00:05:21.127: State[PPP TERMINATING] counter is 0
*Mar 1 00:05:21.127: GPRS:1111110000000000:state [VPDN CONNECTING->PPP NEGOTIATING] on
event [VPDN CONNECTED]
*Mar 1 00:05:21.127: GPRS:1111110000000000:Start PPP negotiations on vaccess
*Mar 1 00:05:21.131: %LINK-3-UPDOWN: Interface Virtual-Access5, changed state to up
*Mar 1 00:05:22.135: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access5,
changed state to up
*Mar 1 00:05:23.143: GPRS:1111110000000000:IPCP is up
*Mar 1 00:05:23.143: GPRS:1111110000000000:LNS allocates 10.10.1.187 for MS
*Mar 1 00:05:23.143: GPRS:1111110000000000:IP addr 10.10.1.187 is negotiated for MS
*Mar 1 00:05:23.143: GPRS:1111110000000000:DNS - Primary: 10.3.0.1 Secondary: 0.0.0.0
NetBios - Primary: 0.0.0.0, Secondary: 0.0.0.0
*Mar 1 00:05:23.143: GPRS:1111110000000000:PPP connected
*Mar 1 00:05:23.143: GPRS:1111110000000000:got event [PPP NEGOTIATED] in state [PPP
NEGOTIATING]
*Mar 1 00:05:23.143: PPP-REGEN state counters: pending counter is 0
*Mar 1 00:05:23.143: State[IDLE] counter is 0
*Mar 1 00:05:23.143: State[AUTHORIZING] counter is 0
*Mar 1 00:05:23.143: State[VPDN CONNECTING] counter is 0
*Mar 1 00:05:23.143: State[PPP NEGOTIATING] counter is 0
*Mar 1 00:05:23.143: State[PPP CONNECTED] counter is 1
*Mar 1 00:05:23.143: State[PPP TERMINATING] counter is 0
*Mar 1 00:05:23.143: GPRS:1111110000000000:state [PPP NEGOTIATING->PPP CONNECTED] on
event [PPP NEGOTIATED]
*Mar 1 00:05:23.143: GPRS:1111110000000000:PPP succeeded negotiation, session established
*Mar 1 00:05:23.143: GPRS:1111110000000000:Session timer stopped

```

Example 5

The following example displays both debug events and details related to PPP regeneration processing for a delete PDP context requested received by the GGSN:

```

Router# debug gprs gtp-director events
Router# debug gprs gtp-director details
*Mar 1 00:05:52.399: PPP-REGEN state counters: pending counter is 0
*Mar 1 00:05:52.399: State[IDLE] counter is 0
*Mar 1 00:05:52.399: State[AUTHORIZING] counter is 0
*Mar 1 00:05:52.399: State[VPDN CONNECTING] counter is 0
*Mar 1 00:05:52.399: State[PPP NEGOTIATING] counter is 0
*Mar 1 00:05:52.399: State[PPP CONNECTED] counter is 1
*Mar 1 00:05:52.399: State[PPP TERMINATING] counter is 0
*Mar 1 00:05:52.399: GPRS:1111110000000000:PPP regen current state PPP CONNECTED
*Mar 1 00:05:52.399: GPRS:1111110000000000:GTP disconnecting the PPP regen session
*Mar 1 00:05:52.399: GPRS:1111110000000000:Processing Disconnect PPP regen from reqQ
*Mar 1 00:05:52.399: GPRS:1111110000000000:got event [CANCEL REGEN'ED PPP] in state [PPP
CONNECTED]
*Mar 1 00:05:52.399: PPP-REGEN state counters: pending counter is 1
*Mar 1 00:05:52.399: State[IDLE] counter is 0
*Mar 1 00:05:52.399: State[AUTHORIZING] counter is 0
*Mar 1 00:05:52.399: State[VPDN CONNECTING] counter is 0
*Mar 1 00:05:52.399: State[PPP NEGOTIATING] counter is 0
*Mar 1 00:05:52.399: State[PPP CONNECTED] counter is 0
*Mar 1 00:05:52.399: State[PPP TERMINATING] counter is 1
*Mar 1 00:05:52.399: GPRS:1111110000000000:state [PPP CONNECTED->PPP TERMINATING] on
event [CANCEL REGEN'ED PPP]

```

```

*Mar 1 00:05:52.399: GPRS:1111110000000000:Cancel request after VPND tunnel is up
*Mar 1 00:05:52.403: GPRS:1111110000000000:PPP down
*Mar 1 00:05:52.403: GPRS:1111110000000000:got event [PPP FAILED] in state [PPP
TERMINATING]
*Mar 1 00:05:52.407: PPP-REGEN state counters: pending counter is 1
*Mar 1 00:05:52.407: State[IDLE] counter is 1
*Mar 1 00:05:52.407: State[AUTHORIZING] counter is 0
*Mar 1 00:05:52.407: State[VPDN CONNECTING] counter is 0
*Mar 1 00:05:52.407: State[PPP NEGOTIATING] counter is 0
*Mar 1 00:05:52.407: State[PPP CONNECTED] counter is 0
*Mar 1 00:05:52.407: State[PPP TERMINATING] counter is 0
*Mar 1 00:05:52.407: GPRS:1111110000000000:state [PPP TERMINATING->IDLE] on event [PPP
FAILED]
*Mar 1 00:05:52.407: GPRS:1111110000000000:PPP failed negotiation
*Mar 1 00:05:52.407: GPRS:1111110000000000:got event [CLEANUP CONTEXT] in state [IDLE]
*Mar 1 00:05:52.407: GPRS:1111110000000000:VPDN to inform PPP regen: DISCONNECTED
*Mar 1 00:05:52.407: GPRS:1111110000000000:got event [VPDN DISCONNECTED] in state [IDLE]
*Mar 1 00:05:52.407: GPRS:1111110000000000:state [IDLE->IDLE] on event [CLEANUP CONTEXT]
*Mar 1 00:05:52.407: GPRS:1111110000000000:Freeing context structure
*Mar 1 00:05:52.407: GPRS:1111110000000000:Session timer stopped
*Mar 1 00:05:52.407: PPP-REGEN state counters: pending counter is 0
*Mar 1 00:05:52.407: State[IDLE] counter is 0
*Mar 1 00:05:52.407: State[AUTHORIZING] counter is 0
*Mar 1 00:05:52.407: State[VPDN CONNECTING] counter is 0
*Mar 1 00:05:52.407: State[PPP NEGOTIATING] counter is 0
*Mar 1 00:05:52.407: State[PPP CONNECTED] counter is 0
*Mar 1 00:05:52.407: State[PPP TERMINATING] counter is 0
*Mar 1 00:05:52.407: GPRS:1111110000000000:PPP regen context 0x6219F4BC released
*Mar 1 00:05:52.407: GPRS:GTP-PPP-REGEN context magic(0x619D4FBC) invalid
*Mar 1 00:05:52.407: %LINK-3-UPDOWN: Interface Virtual-Access5, changed state to down
*Mar 1 00:05:53.399: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access5,
changed state to down

```

Example 6

The following example displays both debug events and details related to PPP regeneration processing as the GGSN clears a PDP context request:

```

Router# debug gprs gtp-director events
Router# debug gprs gtp-director details
*Mar 1 00:06:34.907: PPP-REGEN state counters: pending counter is 0
*Mar 1 00:06:34.907: State[IDLE] counter is 0
*Mar 1 00:06:34.907: State[AUTHORIZING] counter is 0
*Mar 1 00:06:34.907: State[VPDN CONNECTING] counter is 0
*Mar 1 00:06:34.907: State[PPP NEGOTIATING] counter is 0
*Mar 1 00:06:34.907: State[PPP CONNECTED] counter is 1
*Mar 1 00:06:34.907: State[PPP TERMINATING] counter is 0
*Mar 1 00:06:34.907: GPRS:1111110000000000:PPP regen current state PPP CONNECTED
*Mar 1 00:06:34.907: GPRS:1111110000000000:GTP disconnecting the PPP regen session
*Mar 1 00:06:34.907: GPRS:1111110000000000:Processing Disconnect PPP regen from reqQ
*Mar 1 00:06:34.907: GPRS:1111110000000000:got event [CANCEL REGEN'ED PPP] in state [PPP
CONNECTED]
*Mar 1 00:06:34.907: PPP-REGEN state counters: pending counter is 1
*Mar 1 00:06:34.907: State[IDLE] counter is 0
*Mar 1 00:06:34.907: State[AUTHORIZING] counter is 0
*Mar 1 00:06:34.907: State[VPDN CONNECTING] counter is 0
*Mar 1 00:06:34.907: State[PPP NEGOTIATING] counter is 0
*Mar 1 00:06:34.907: State[PPP CONNECTED] counter is 0
*Mar 1 00:06:34.907: State[PPP TERMINATING] counter is 1
*Mar 1 00:06:34.907: GPRS:1111110000000000:state [PPP CONNECTED->PPP TERMINATING] on
event [CANCEL REGEN'ED PPP]
*Mar 1 00:06:34.907: GPRS:1111110000000000:Cancel request after VPND tunnel is up
*Mar 1 00:06:34.911: GPRS:1111110000000000:PPP down

```

```
*Mar 1 00:06:34.911: GPRS:1111110000000000:got event [PPP FAILED] in state [PPP
TERMINATING]
*Mar 1 00:06:34.915: PPP-REGEN state counters: pending counter is 1
*Mar 1 00:06:34.915: State[IDLE] counter is 1
*Mar 1 00:06:34.915: State[AUTHORIZING] counter is 0
*Mar 1 00:06:34.915: State[VPDN CONNECTING] counter is 0
*Mar 1 00:06:34.915: State[PPP NEGOTIATING] counter is 0
*Mar 1 00:06:34.915: State[PPP CONNECTED] counter is 0
*Mar 1 00:06:34.915: State[PPP TERMINATING] counter is 0
*Mar 1 00:06:34.915: GPRS:1111110000000000:state [PPP TERMINATING->IDLE] on event [PPP
FAILED]
*Mar 1 00:06:34.915: GPRS:1111110000000000:PPP failed negotiation
*Mar 1 00:06:34.915: GPRS:1111110000000000:got event [CLEANUP CONTEXT] in state [IDLE]
*Mar 1 00:06:34.915: GPRS:1111110000000000:VPDN to inform PPP regen: DISCONNECTED
*Mar 1 00:06:34.915: GPRS:1111110000000000:got event [VPDN DISCONNECTED] in state [IDLE]
*Mar 1 00:06:34.915: GPRS:1111110000000000:state [IDLE->IDLE] on event [CLEANUP CONTEXT]
*Mar 1 00:06:34.915: GPRS:1111110000000000:Freeing context structure
*Mar 1 00:06:34.915: GPRS:1111110000000000:Session timer stopped
*Mar 1 00:06:34.915: PPP-REGEN state counters: pending counter is 0
*Mar 1 00:06:34.915: State[IDLE] counter is 0
*Mar 1 00:06:34.915: State[AUTHORIZING] counter is 0
*Mar 1 00:06:34.915: State[VPDN CONNECTING] counter is 0
*Mar 1 00:06:34.915: State[PPP NEGOTIATING] counter is 0
*Mar 1 00:06:34.915: State[PPP CONNECTED] counter is 0
*Mar 1 00:06:34.915: State[PPP TERMINATING] counter is 0
*Mar 1 00:06:34.915: GPRS:1111110000000000:PPP regen context 0x62196E10 released
*Mar 1 00:06:34.915: GPRS:GTP-PPP-REGEN context magic(0x619D4FBC) invalid
*Mar 1 00:06:34.915: %LINK-3-UPDOWN: Interface Virtual-Access3, changed state to down
*Mar 1 00:06:35.907: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access3,
changed state to down
```

debug gprs gtp parsing

To display information about the parsing of GPRS Tunneling Protocol (GTP) information elements (IEs) in signaling requests, use the **debug gprs gtp parsing** privileged EXEC command. To disable debugging output, use the **no** form of this command.

debug gprs gtp parsing

no debug gprs gtp parsing

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values.

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

This command is useful for system operators and development engineers to verify parsing of GTP IEs in signaling requests that are received by GDM or by the GGSN. If the packet is parsed successfully, you will receive a message along with the TID for the packet as shown in the following example:

```
GPRS:TID:7300000000000000:Packet Parsed successfully
```

The **debug gprs gtp parsing** command can be used to verify GDM or GGSN processing of IEs.



Caution

Because the **debug gprs gtp parsing** command generates a significant amount of output, use it only when traffic on the GPRS network is low, so other activity on the system is not adversely affected.

Examples

The following example enables the display of debug messages that occur while GDM or the GGSN parses GTP IEs:

```
Router# debug gprs gtp parsing
```

debug gprs gtp ppp

To display information about PPP PDP type processing on the GGSN, use the **debug gprs gtp ppp** privileged EXEC command. To disable debugging output, use the **no** form of this command.

debug gprs gtp ppp {events | details}

no debug gprs gtp ppp {events | details}

Syntax Description

events	Displays messages specific to certain conditions that are occurring during PPP PDP type processing.
details	Displays more extensive and lower-level messages related to PPP PDP type processing.

Defaults

No default behavior or values.

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

This command is useful for system operators and development engineers if problems are encountered with PPP PDP type processing on the GGSN.

You can enable both forms of the **debug gprs gtp ppp** command at the same time, as separate command line entries. The **events** keyword generates output specific to certain conditions that are occurring, which helps qualify the output being received using the **details** option.



Caution

Because the **debug gprs gtp ppp** command generates a significant amount of output, use it only when traffic on the GPRS network is low, so other activity on the system is not adversely affected.

Examples

The following debug examples provide sample output for a create PDP context request and clear PDP context using PPP PDP type on the GGSN. The examples show output while both debug events and details are enabled on the GGSN.

Example 1

The following example displays details and events output related to PPP PDP context processing for a create PDP context requested received by the GGSN:

```
Router# debug gprs gtp ppp events
GTP PPP events display debugging is on
Router# debug gprs gtp ppp details
GTP PPP details display debugging is on
tb9-7200b#
```

```

3d23h: GPRS:
3d23h: GTP-PPP Fal/0: Create new gtp_ppp_info
3d23h: GPRS:
3d23h: GTP-PPP: domain gprs.cisco.com not in any VPDN group
3d23h: GPRS:
3d23h: GTP-PPP: aaa-group accounting not configured under APN gprs.cisco.com
3d23h: GPRS:GTP-PPP: Don't cache internally generated pak's header
3d23h: %LINK-3-UPDOWN: Interface Virtual-Access2, changed state to up
3d23h: GPRS:
3d23h: GTP-PPP Vi2: gtp_ppp_cstate_react changing states
3d23h: GPRS:GTP-PPP: pdp_entry 0x62F442A4, recv ppp data pak
3d23h: GPRS:GTP-PPP Vi2: proc_udp_input pak's linktype = 30
3d23h: GPRS:GTP-PPP: pdp_entry 0x62F442A4, recv ppp data pak
3d23h: GPRS:GTP-PPP Vi2: proc_udp_input pak's linktype = 30
3d23h: GPRS:GTP-PPP: pdp_entry 0x62F442A4, recv ppp data pak
3d23h: GPRS:GTP-PPP Vi2: proc_udp_input pak's linktype = 30
3d23h: GPRS:
3d23h: GTP-PPP: Vi2: Concat names user00 & gprs.cisco.com
3d23h: GPRS:
3d23h: GTP-PPP: New username after concat: user00@gprs.cisco.com
3d23h: GPRS:
3d23h: GTP-PPP: Vi2: Concat names user00@gprs.cisco.com & gprs.cisco.com
3d23h: GPRS:
3d23h: GTP-PPP: New username after concat: user00@gprs.cisco.com
3d23h: GPRS:GTP-PPP: pdp_entry 0x62F442A4, recv ppp data pak
3d23h: GPRS:GTP-PPP Vi2: proc_udp_input pak's linktype = 30
3d23h: GPRS:GTP-PPP: pdp_entry 0x62F442A4, recv ppp data pak
3d23h: GPRS:GTP-PPP Vi2: proc_udp_input pak's linktype = 30
3d23h: GPRS:GTP-PPP: pdp_entry 0x62F442A4, recv ppp data pak
3d23h: GPRS:GTP-PPP Vi2: proc_udp_input pak's linktype = 30
3d23h: GPRS:GTP-PPP: pdp_entry 0x62F442A4, recv ppp data pak
3d23h: GPRS:GTP-PPP Vi2: proc_udp_input pak's linktype = 30
3d23h: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access2, changed state to up
3d23h: GPRS:GTP-PPP: pdp_entry 0x62F442A4, recv ppp data pak
3d23h: GPRS:GTP-PPP Vi2: proc_udp_input pak's linktype = 30
3d23h: GPRS:GTP-PPP: pdp_entry 0x62F442A4, recv ppp data pak
3d23h: GPRS:GTP-PPP Vi2: proc_udp_input pak's linktype = 30
3d23h: GPRS:
3d23h: GTP-PPP Vi2: gtp_ppp_protocol_up is notified about intf UP
3d23h: GPRS:
3d23h: GTP-PPP Vi2: PDP w/ MS addr 98.102.0.1 inserted into IP radix tree

```

Example 2

The following example displays both details and events related to PPP PDP type processing after clearing PDP contexts on the GGSN:

```

Router# clear gprs gtp pdp-context all
3d23h: GPRS:GTP-PPP: pdp_entry 0x62F442A4, recv ppp data pak
3d23h: GPRS:GTP-PPP Vi2: proc_udp_input pak's linktype = 30
3d23h: GPRS:GTP-PPP: pdp_entry 0x62F442A4, recv ppp data pak
3d23h: GPRS:GTP-PPP Vi2: proc_udp_input pak's linktype = 30
3d23h: GPRS:
3d23h: GTP-PPP Vi2: gtp_ppp_pdp_terminate shutting down the vaccess
3d23h: GPRS:
3d23h: GTP-PPP Vi2: gtp_ppp_pdp_shut_va shutting down intf
3d23h: %LINK-3-UPDOWN: Interface Virtual-Access2, changed state to down
3d23h: GPRS:
3d23h: GTP-PPP Vi2: gtp_ppp_cstate_react changing states
3d23h: GPRS:
3d23h: GTP-PPP Vi2: gtp_ppp_free_va resetting intf vectors
3d23h: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access2, changed state to down

```

debug gprs gtp ppp-regeneration

To display information about PPP regeneration processing on the GGSN, use the **debug gprs gtp ppp-regeneration** privileged EXEC command. To disable debugging output, use the **no** form of this command.

```
debug gprs gtp ppp-regeneration { events | details }
```

```
no debug gprs gtp ppp-regeneration { events | details }
```

Syntax Description

events	Displays messages specific to certain conditions that are occurring during PPP regeneration processing.
details	Displays more extensive and lower-level messages related to PPP regeneration processing.

Defaults

No default behavior or values.

Command History

Release	Modification
12.2(4)MX	This command was introduced.
12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines

This command is useful for system operators and development engineers if problems are encountered with communication between GDM and a GGSN.

You can enable both forms of the **debug gprs gtp ppp-regeneration** command at the same time, as separate command line entries. The **events** keyword generates output specific to certain conditions that are occurring, which helps qualify the output being received using the **details** option.



Caution

Because the **debug gprs gtp ppp-regeneration** command generates a significant amount of output, use it only when traffic on the GPRS network is low, so other activity on the system is not adversely affected.

Examples

The following debug examples provide sample output for a create PDP context request and clear PDP context using PPP regeneration on the GGSN. The examples show output while both debug events and details are enabled on the GGSN.

Example 1

The following example displays details and events output related to PPP regeneration processing for a create PDP context requested received by the GGSN:

```
Router# debug gprs gtp ppp-regeneration details
GTP PPP regeneration details display debugging is on
Router# debug gprs gtp ppp-regeneration events
GTP PPP regeneration events display debugging is on
```

```
06:24:02: PPP-REGEN state counters: pending counter is 0
06:24:02:      State[IDLE] counter is 0
06:24:02:      State[AUTHORIZING] counter is 0
06:24:02:      State[VPDN CONNECTING] counter is 0
06:24:02:      State[PPP NEGOTIATING] counter is 0
06:24:02:      State[PPP CONNECTED] counter is 0
06:24:02:      State[PPP TERMINATING] counter is 0
06:24:02: PPP-REGEN state counters: pending counter is 1
06:24:02:      State[IDLE] counter is 1
06:24:02:      State[AUTHORIZING] counter is 0
06:24:02:      State[VPDN CONNECTING] counter is 0
06:24:02:      State[PPP NEGOTIATING] counter is 0
06:24:02:      State[PPP CONNECTED] counter is 0
06:24:02:      State[PPP TERMINATING] counter is 0
06:24:02: GPRS:101111111500001:Authen: PAP username: tomy1@corporate_1.com
06:24:02: GPRS:101111111500001:Session timer started
06:24:02: GPRS:Processing PPP regen reqQ
06:24:02: GPRS:101111111500001:Processing Initiate PPP  regen from reqQ
06:24:02: GPRS:101111111500001:got event [REQUEST PPP REGEN] in state [IDLE]
06:24:02: PPP-REGEN state counters: pending counter is 1
06:24:02:      State[IDLE] counter is 0
06:24:02:      State[AUTHORIZING] counter is 1
06:24:02:      State[VPDN CONNECTING] counter is 0
06:24:02:      State[PPP NEGOTIATING] counter is 0
06:24:02:      State[PPP CONNECTED] counter is 0
06:24:02:      State[PPP TERMINATING] counter is 0
06:24:02: GPRS:101111111500001:state [IDLE->AUTHORIZING] on event [REQUEST PPP REGEN]
06:24:02: GPRS:101111111500001:Got VPN authorization info
06:24:02: GPRS:101111111500001:got event [AUTHOR SUCCESS] in state [AUTHORIZING]
06:24:02: PPP-REGEN state counters: pending counter is 1
06:24:02:      State[IDLE] counter is 0
06:24:02:      State[AUTHORIZING] counter is 0
06:24:02:      State[VPDN CONNECTING] counter is 1
06:24:02:      State[PPP NEGOTIATING] counter is 0
06:24:02:      State[PPP CONNECTED] counter is 0
06:24:02:      State[PPP TERMINATING] counter is 0
06:24:02: GPRS:101111111500001:state [AUTHORIZING->VPDN CONNECTING] on event [AUTHOR
SUCCESS]
06:24:02: GPRS:101111111500001:Author succeeded, establishing the tunnel
06:24:02: GPRS:101111111500001:Create/Clone vaccess to negotiate PPP
06:24:02: GPRS:101111111500001:no need to set NS ppp_config
06:24:02: GPRS:101111111500001:MS no static IP addr. Get one via IPCP
06:24:02: GPRS:101111111500001:VPDN to inform PPP regen: CONNECTED
06:24:02: GPRS:101111111500001:got event [VPDN CONNECTED] in state [VPDN CONNECTING]
06:24:02: PPP-REGEN state counters: pending counter is 1
06:24:02:      State[IDLE] counter is 0
06:24:02:      State[AUTHORIZING] counter is 0
06:24:02:      State[VPDN CONNECTING] counter is 0
06:24:02:      State[PPP NEGOTIATING] counter is 1
06:24:02:      State[PPP CONNECTED] counter is 0
06:24:02:      State[PPP TERMINATING] counter is 0
06:24:02: GPRS:101111111500001:state [VPDN CONNECTING->PPP NEGOTIATING] on event [VPDN
CONNECTED]
06:24:02: GPRS:101111111500001:Start PPP negotiations on vaccess
06:24:02: %LINK-3-UPDOWN: Interface Virtual-Access2, changed state to up
06:24:02: GPRS:101111111500001:IPCP is up
06:24:02: GPRS:101111111500001:LNS allocates 10.100.1.1 for MS
06:24:02: GPRS:101111111500001:IP addr 10.100.1.1 is negotiated for MS
06:24:02: GPRS:101111111500001:PPP connected
06:24:02: GPRS:101111111500001:got event [PPP NEGOTIATED] in state [PPP NEGOTIATING]
06:24:02: PPP-REGEN state counters: pending counter is 0
06:24:02:      State[IDLE] counter is 0
06:24:02:      State[AUTHORIZING] counter is 0
06:24:02:      State[VPDN CONNECTING] counter is 0
```

```

06:24:02:          State[PPP NEGOTIATING] counter is 0
06:24:02:          State[PPP CONNECTED] counter is 1
06:24:02:          State[PPP TERMINATING] counter is 0
06:24:02: GPRS:1011111111500001:state [PPP NEGOTIATING->PPP CONNECTED] on event [PPP
NEGOTIATED]
06:24:02: GPRS:1011111111500001:PPP succeeded negotiation, session established
06:24:02: GPRS:1011111111500001:Session timer stopped
06:24:03: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access2, changed state
to up

```

Example 2

The following example displays both details and events related to PPP regeneration processing after clearing PDP contexts on the GGSN:

```

Router# clear gprs gtp pdp-context all
06:28:05: PPP-REGEN state counters: pending counter is 0
06:28:05:          State[IDLE] counter is 0
06:28:05:          State[AUTHORIZING] counter is 0
06:28:05:          State[VPDN CONNECTING] counter is 0
06:28:05:          State[PPP NEGOTIATING] counter is 0
06:28:05:          State[PPP CONNECTED] counter is 1
06:28:05:          State[PPP TERMINATING] counter is 0
06:28:05: GPRS:1011111111500001:PPP regen current state PPP CONNECTED
06:28:05: GPRS:1011111111500001:GTP disconnecting the PPP regen session
06:28:05: GPRS:Processing PPP regen reqQ
06:28:05: GPRS:1011111111500001:Processing Disconnect PPP regen from reqQ
06:28:05: GPRS:1011111111500001:got event [CANCEL REGEN'ED PPP] in state [PPP CONNECTED]
06:28:05: PPP-REGEN state counters: pending counter is 1
06:28:05:          State[IDLE] counter is 0
06:28:05:          State[AUTHORIZING] counter is 0
06:28:05:          State[VPDN CONNECTING] counter is 0
06:28:05:          State[PPP NEGOTIATING] counter is 0
06:28:05:          State[PPP CONNECTED] counter is 0
06:28:05:          State[PPP TERMINATING] counter is 1
06:28:05: GPRS:1011111111500001:state [PPP CONNECTED->PPP TERMINATING] on event [CANCEL
REGEN'ED PPP]
06:28:05: GPRS:1011111111500001:Cancel request after VPND tunnel is up
06:28:05: PPP-REGEN state counters: pending counter is 1
06:28:05:          State[IDLE] counter is 0
06:28:05:          State[AUTHORIZING] counter is 0
06:28:05:          State[VPDN CONNECTING] counter is 0
06:28:05:          State[PPP NEGOTIATING] counter is 0
06:28:05:          State[PPP CONNECTED] counter is 0
06:28:05:          State[PPP TERMINATING] counter is 1
06:28:05: GPRS:1011111111500001:PPP down
06:28:05: GPRS:1011111111500001:got event [PPP FAILED] in state [PPP TERMINATING]
06:28:05: PPP-REGEN state counters: pending counter is 1
06:28:05:          State[IDLE] counter is 1
06:28:05:          State[AUTHORIZING] counter is 0
06:28:05:          State[VPDN CONNECTING] counter is 0
06:28:05:          State[PPP NEGOTIATING] counter is 0
06:28:05:          State[PPP CONNECTED] counter is 0
06:28:05:          State[PPP TERMINATING] counter is 0
06:28:05: GPRS:1011111111500001:state [PPP TERMINATING->IDLE] on event [PPP FAILED]
06:28:05: GPRS:1011111111500001:LCP went down
06:28:05: GPRS:1011111111500001:VPDN disconnect
06:28:05: GPRS:1011111111500001:got event [CLEANUP CONTEXT] in state [IDLE]
06:28:05: GPRS:1011111111500001:state [IDLE->IDLE] on event [CLEANUP CONTEXT]
06:28:05: GPRS:1011111111500001:Freeing context structure
06:28:05: GPRS:1011111111500001:VPDN handle invalid, no need to free it
06:28:05: GPRS:1011111111500001:remove PPP regen context from Vi2
06:28:05: GPRS:1011111111500001:Session timer stopped

```

```
06:28:05: PPP-REGEN state counters: pending counter is 0
06:28:05:           State[IDLE] counter is 0
06:28:05:           State[AUTHORIZING] counter is 0
06:28:05:           State[VPDN CONNECTING] counter is 0
06:28:05:           State[PPP NEGOTIATING] counter is 0
06:28:05:           State[PPP CONNECTED] counter is 0
06:28:05:           State[PPP TERMINATING] counter is 0
06:28:05: GPRS:101111111500001:PPP regen context 0x633F196C released
06:28:05: %LINK-3-UPDOWN: Interface Virtual-Access2, changed state to down
06:28:06: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access2, changed state
to down
```

debug gprs radius

To display information about Remote Access Dial-In User Service (RADIUS) processing on the GGSN, use the **debug gprs radius** privileged EXEC command. To disable debugging output, use the **no** form of this command.

debug gprs radius

no debug gprs radius

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values.

Command History	Release	Modification
	12.2(4)MX	This command was introduced.
	12.2(8)YD	This command was incorporated in Cisco IOS Release 12.2(8)YD.
	12.2(8)YW	This command was incorporated in Cisco IOS Release 12.2(8)YW.

Usage Guidelines This command is useful for system operators and development engineers if problems are encountered with communication between a RADIUS server and the GGSN.



Caution

Because the **debug gprs radius** command generates a significant amount of output, use it only when traffic on the GPRS network is low, so other activity on the system is not adversely affected.

Examples The following example enables the display of debug messages related to RADIUS processing on the GGSN:

```
Router# debug gprs radius
```



Table of MCC and MNC Codes

Table 45 provides a reference for some of the established mobile country codes and mobile network codes in use today. When MNC codes are not available, only the country code is provided.



Note

This table provides a list of some known MCC and MNC codes at the time of this publication. This list is subject to change as new service providers and countries are added. To find more information about MCC and MNC codes, see the ITU E.212 recommendation, *Identification Plan for Land Mobile Stations*.

Table 45 List of Some Established MCC and MNC Values

Country	Service Provider Name	MCC MNC
Albania	AMC	276 01
Andorra	STA-Mobiland	213 03
Argentine Republic		722
Armenia	Armentel	283 01
Australia	OptusTelecom	505 02
	Telstra	505 01
	Vodafone	505 03
Austria	Mobilkom Austria	232 01
	max.mobil.	232 03
	Connect Austria	232 05
Azerbaijan	Azercell	400 01
	JV Bakcell	400 02
Bahrain	Batelco	426 01
Bangladesh	Grameen Phone Ltd	470 01
	TM International	470 19
	Sheba Telecom	470

Table 45 List of Some Established MCC and MNC Values

Country	Service Provider Name	MCC MNC
Belgium	Proximus	206 01
	Mobistar	206 10
	KPN Orange	206 20
Bosnia	Cronet	218 01
	PTT Bosnia	218 19
Botswana	Mascom Wireless	652 01
Brunei	DSTCom	528 11
	Jabatan Telekom	528 01
Bulgaria	MobilTel AD	284 01
Burkina Faso	OnaTel	613
Cambodia	CamGSM	456 01
	Cambodia Samart	456 02
	Cambodia Shinawatra	456
Cameroon	PTT Cameroon Cellnet	624 01
Canada	Microcell	302 37
Cape Verde	Cabo Verde Telecom	625 01
Chile	Entel Telefonía	730
China	Guangdong MCC	460 00
	Beijing Wireless	460
	China Unicom	460 01
	Zhuhai Comms	460
	DGT MPT	460
	Jiaxing PTT	460
	Tjianjin Toll	460
	Liaoning PPTA	460 02
Congo	African Telecoms	629
	Congolaise Wireless	629
Croatia	HR Cronet	219 01
	Vipnet	219 10
Cyprus	CYTA	280 01
Czech Rep.	Eurotel Praha	230 02
	Radio Mobil	230 01
Denmark	Sonofon	238 02
	Tele Danmark Mobil	238 01
	Mobilix	238 30
	Telia	238 20

Table 45 *List of Some Established MCC and MNC Values*

Country	Service Provider Name	MCC MNC
Egypt	MobiNil	602 01
	Click GSM	602 02
Estonia	EMT	248 01
	Radiolinja Eesti	248 02
	Q GSM	248 03
Ethiopia	ETA	636 01
Faroe Islands	Faroese Telecom	288
Fiji	Vodafone	542 01
Finland	Radiolinja	244 05
	Sonera	244 91
	Alands Mobiltelefon	244 05
	Telia	244 03
	Finnet	244 09
	Lnnen Puhelin	244 09
	Helsingin Puhelin	244 09
France	France Telecom	208 01
	SFR	208 10
	Bouygues Telekom	208 20
Fr.Polynesia	Tikiphone	547 20
Fr.W.Indies	Ameris	340 01
Georgia	Superphone	282
	Geocell	282 01
	Magticom	282 02
Germany	D1, DeTeMobil	262 01
	D2, Mannesmann	262 02
	E-Plus Mobilfunk	262 03
	Viag Interkom	262 07
Ghana	Franci Walker Ltd	620
	ScanCom	620 01
Gibraltar	GibTel	266 01

Table 45 *List of Some Established MCC and MNC Values*

Country	Service Provider Name	MCC MNC
Great Britain	Cellnet	234 10
	Vodafone	234 15
	Jersey Telecom	234 50
	Guernsey Telecom	234 55
	Manx Telecom	234 58
	One2One	234 30
	Orange	234 33
Greece	Panafon	202 05
	STET	202 10
	Cosmote	202 01
Greenland	Tele Greenland	290
Guinea	Int'l Wireless	611
	Spacotel	611
	Sotelgui	611 02
Hong Kong	HK Hutchison	454 04
	SmarTone	454 06
	Telecom CSL	454 00
	P Plus Comm	454 22
	New World PCS	454 10
	Mandarin Comm	454 16
	Pacific Link	454 18
	Peoples Telephone	454 12
SMC PCS	454 22	
Hungary	Pannon GSM	216 01
	Westel 900	216 30

Table 45 *List of Some Established MCC and MNC Values*

Country	Service Provider Name	MCC MNC
India	Airtel	404 10
	Essar	404 11
	Maxtouch	404 20
	BPLMobile	404 21
	Command	404 30
	Mobilenet	404 31
	Skycell	404 40
	RPG MAA	404 41
	Modi Telstra	404 14
	Sterling Cellular	404 11
	Mobile Telecom	404
	Airtouch	404
	BPL USWest	404
	Koshika	404
	Bharti Telenet	404
	Birla Comm	404
	Cellular Comms	404 27
	TATA	404 07
	Escotel	404 12
	JT Mobiles	404
Evergrowth Telecom	404	
Aircel Digilink	404 15	
Hexacom India	404	
Reliance Telecom	404	
Fascel Limited	404	
Indonesia	TELKOMSEL	510 10
	PT Satelit Palapa	510 01
	Excelcom	510 11
	PT Indosat	510
Iraq	Iraq Telecom	418
Iran	T.C.I.	432 11
	Celcom	432
	Kish Free Zone	432

Table 45 List of Some Established MCC and MNC Values

Country	Service Provider Name	MCC MNC
Ireland	Eircell	272 01
	Digifone	272 02
	Meteor	272 03
Israel	Partner Communications	425 01
Italy	Omnitel	222 10
	Telecom Italia Mobile	222 01
	Wind	222 88
Ivory Coast	Ivoiris	612 03
	Telecel	612
	Comstar	612 01
	Loteny Telecom	612 05
Japan		440
Jordan	MTS	416 01
Kenya	Kenya Telecom	639
Kuwait	MTCNet	419 02
Kyrgyz Rep	Bitel Ltd	437 01
La Reunion	SRR	647 10
Laos	Lao Shinawatra	457 01
Latvia	LMT	247 01
	BALTCOM GSM	247 02
Lebanon	Libancell	415 03
	Cellis	415 01
Lesotho	Vodacom	651 01
Liechtenstein	Natel-D	228 01
Lithuania	Omnitel	246 01
	Bite GSM	246 02
Luxembourg	P&T LUXGSM	270 01
	Millicom Lux' S.A	270 77
Macao	CTM	455 01
Macedonia	PTT Makedonija	294 01
Madagascar	Sacel	646 03
	Madacom	646 01
	SMM	646 02
Malawi	TNL	650 01

Table 45 List of Some Established MCC and MNC Values

Country	Service Provider Name	MCC MNC
Malaysia	Celcom	502 19
	Maxis	502 12
	My BSB	502 02
	TM Touch	502 13
	Adam	502 17
	Digi Telecom	502 16
Malta	Advanced	278
	Telecell	278 01
Marocco	O.N.P.T	604 01
Mauritius	Cellplus	617 01
Monaco	France Telecom	208 01
	SFR	208 10
	Office des Telephones	208
Montenegro	Pro Monte	220 02
Mozambique	Telecom de Mocambique	634 01
	T.D.M GSM1800	634
Namibia	MTC	649 01
Netherlands	PTT Netherlands	204 08
	Libertel	204 04
	Telfort Holding NV	204 12
	Ben	204 16
	Dutchtone	204 20
New Caledonia	Mobilis	546 01
New Zealand	Bell South	530 01
Nigeria	EMIS	621
Norway	NetCom	242 02
	TeleNor Mobil	242 01
Oman	General Telecoms	422 02
Pakistan	Mobilink	410 01
Papua	Pacific	310 01
Philippines	Globe Telecom	515 02
	Islacom	515 01
	Smart	515 03
Poland	Plus GSM	260 01
	ERA GSM	260 02
	IDEA Centertel	260 03

Table 45 List of Some Established MCC and MNC Values

Country	Service Provider Name	MCC MNC
Portugal	Telecel	268 01
	TMN	268 06
	Main Road Telecoms	268
	Optimus	268 03
Qatar	Q-Net	427 01
Romania	MobiFon	226 01
	MobilRom	226 10
Russia	Mobile Tele... Moscow	250 01
	United Telecom Moscow	250
	NW GSM, St. Petersburg	250 02
	Dontelekom	250 10
	KB Impuls	250 99
	JSC Siberian Cellular	250
	BM Telecom	250 07
	Beeline	250
	Extel	250 28
Far Eastern Cell	250 12	
San Marino	Omnitel	222 10
	Telecom Italia Mobile	222 01
	Wind	222 88
Saudi Arabia	Al Jawal	420 01
	EAE	420 07
Senegal	Sonatel	608 01
Seychelles	SEZ SEYCEL	633 01
	Airtel	633 10
Serbia	Serbian PTT	220 03
Singapore	Singapore Telecom	525 01
	MobileOne	525 03
	Binariang	525
Slovak Rep	Eurotel	231 02
	Globtel	231 01
Slovenia	Mobitel	293 41
	Si.Mobil	293 40
South Africa	MTN	655 10
	Vodacom	655 01

Table 45 *List of Some Established MCC and MNC Values*

Country	Service Provider Name	MCC MNC
Sri Lanka	MTN Networks Pvt Ltd	413 02
Spain	Airtel	214 01
	Telefonica Spain	214 07
	Amena	214 03
Sudan	Mobitel	634 01
Swaziland		653
Sweden	Comviq	240 07
	Europolitan	240 08
	Telia Mobile	240 01
Switzerland	Swisscom 900	228 01
	Swisscom 1800	228 01
	diAx mobile	228 02
	Orange	228
Syria	SYR MOBILE	417 09
Taiwan	LDTA	466 92
	Mobitai	466 93
	TransAsia	466 99
	TWN	466 97
	Tuntex	466 06
	KGTelecom	466 88
	FarEasTone	466 01
	Chunghwa	466 11
Tanzania	Tritel	640 01
Thailand	TH AIS GSM	520 01
	Total Access Comms	520 18
	WCS	520 10
	Hello	520 23
Tunisia	Tunisian PTT	605 02
Turkey	Telsim	286 02
	Turkcell	286 01
UAE	UAE ETISALAT-G1	424 01
	UAE ETISALAT-G2	424 02
Uganda	Celtel Cellular	641 01
	MTN	641 10

Table 45 *List of Some Established MCC and MNC Values*

Country	Service Provider Name	MCC MNC
Ukraine	Mobile comms	255 01
	Golden Telecom	255 05
	Radio Systems	255 02
	Kyivstar JSC	255 03
USA	Bell South	310 15
	Sprint Spectrum	310 02
	Voice Stream	310 26
	Aerial Comms.	310 31
	Omnipoint	310 16
	Powertel	310 27
	Wireless 2000	310 11
Uzbekistan	Daewoo GSM	434 04
	Coscom	434 05
	Buztel	434 01
Vatican	Omnitel	222 10
	Telecom Italia Mobile	222 01
	Wind	222 88
Venezuela	Infonet	734 01
	Digitel	734
Vietnam	MTSC	452 01
	DGPT	452 02
Yugoslavia	Mobile Telekom	220 01
	Promonte	220 02
	Telekom Serbia	220 03
Zaire	African Telecom Net	630
Zimbabwe	NET*ONE	648 01
	Telecel Zimbabwe	648 04



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D1C	Cisco IOS Dial Technologies Configuration Guide: Dial Access
D2C	Cisco IOS Dial Technologies Configuration Guide: Large-Scale Dial Applications
FC	Cisco IOS Configuration Fundamentals Configuration Guide
IC	Cisco IOS Interface Configuration Guide
IPC	Cisco IOS IP Routing Configuration Guide
MWC	Cisco IOS Mobile Wireless Configuration Guide
P2C	Cisco IOS AppleTalk and Novell IPX Configuration Guide
P3C	Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Configuration Guide
QC	Cisco IOS Quality of Service Solutions Configuration Guide
SC	Cisco IOS Security Configuration Guide
TC	Cisco IOS Terminal Services Configuration Guide
VC	Cisco IOS Voice, Video, and Fax Configuration Guide
WC	Cisco IOS Wide-Area Networking Configuration Guide
XC	Cisco IOS Switching Services Configuration Guide

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