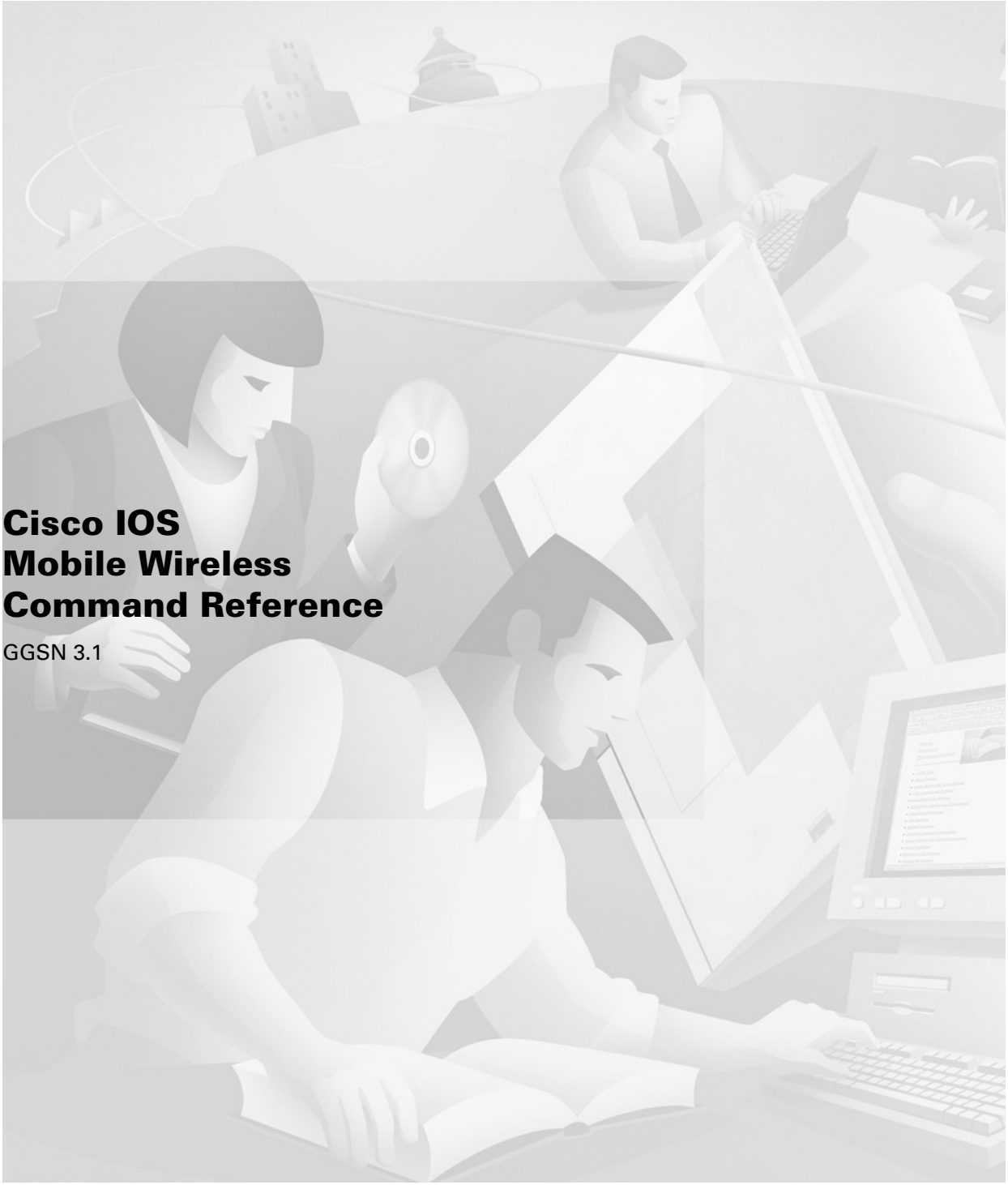
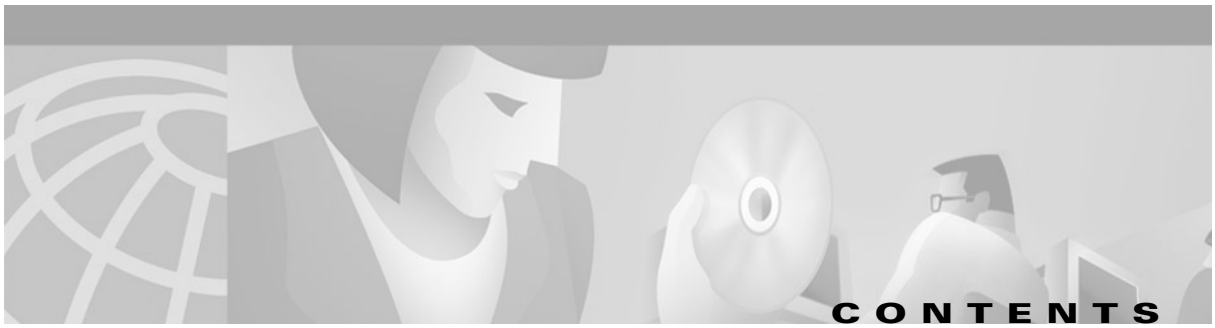


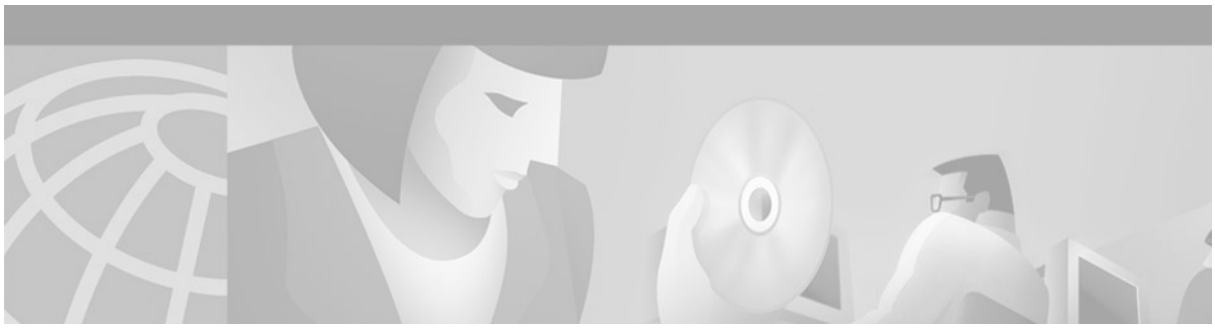
Cisco IOS Mobile Wireless Command Reference

GGSN 3.1

Corporate Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100



CONTENTS



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.

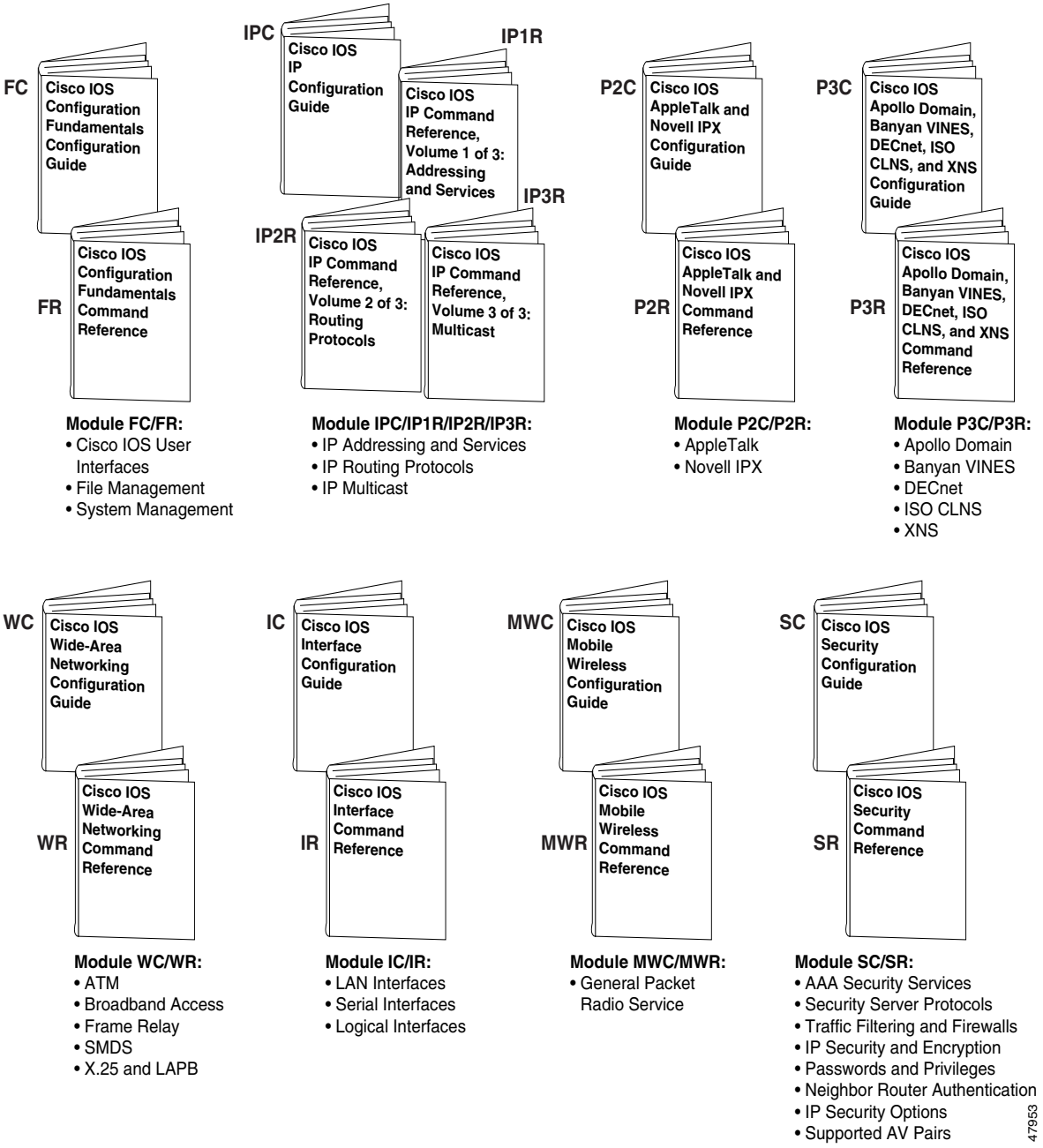
Documentation Modules

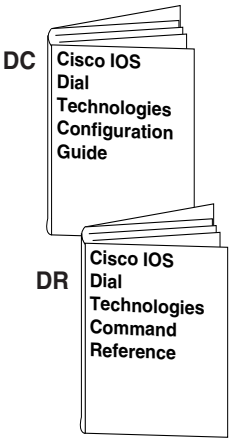
The Cisco IOS documentation modules consist of configuration guides and corresponding command reference publications. Chapters in a configuration guide describe protocols, configuration tasks, and Cisco IOS software functionality and contain comprehensive configuration examples. Chapters in a command 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.

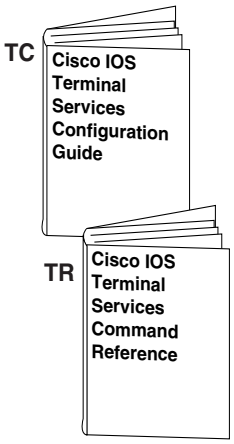
Note The abbreviations (for example, FC and FR) next to the book icons are page designators, which are defined in a key in the index of each document to help you with navigation. The bullets under each module list the major technology areas discussed in the corresponding books.

Figure 1 Cisco IOS Software Documentation Modules

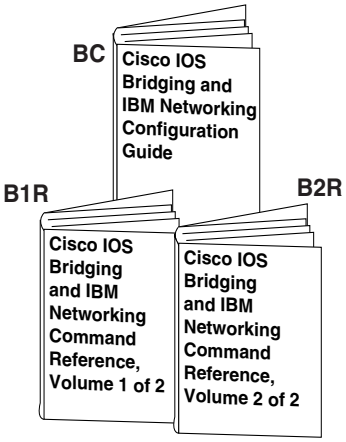




Module DC/DR:
- Preparing for Dial Access
- Modem and Dial Shelf Configuration and Management
- ISDN Configuration
- Signalling Configuration
- Dial-on-Demand Routing Configuration
- Dial-Backup Configuration
- Dial-Related Addressing Services
- Virtual Templates, Profiles, and Networks
- PPP Configuration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

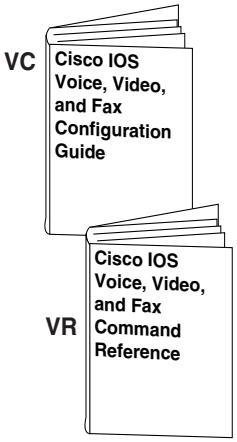


Module TC/TR:
- ARA
- LAT
- NASI
- Telnet
- TN3270
- XRemote
- X.28 PAD
- Protocol Translation

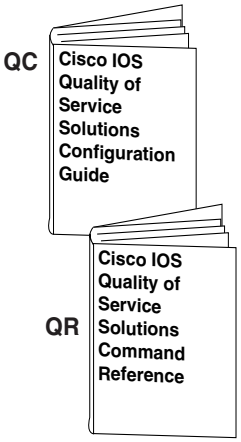


Module BC/B1R:
- Transparent Bridging
- SRB
- Token Ring Inter-Switch Link
- Token Ring Route Switch Module
- RSRB
- DLSw+
- Serial Tunnel and Block Serial Tunnel
- LLC2 and SDLC
- IBM Network Media Translation
- SNA Frame Relay Access
- NCIA Client/Server
- Airline Product Set

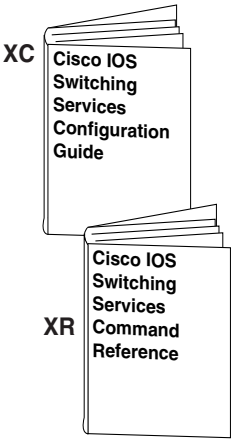
Module BC/B2R:
- DSPU and SNA Service Point
- SNA Switching Services
- Cisco Transaction Connection
- Cisco Mainframe Channel Connection
- CLAW and TCP/IP Offload
- CSNA, CMPC, and CMPC+
- TN3270 Server



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

47954

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.
string	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.
italics	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

The following sections provide sources for obtaining documentation from Cisco Systems.

World Wide Web

The most current Cisco documentation is available on the World Wide Web at the following website:

http://www.cisco.com

Translated documentation is available at the following website:

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

Documentation CD-ROM

Cisco documentation and additional literature are available in a CD-ROM package, which ships 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

Cisco documentation can be ordered in the following ways:

- Registered 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 corporate headquarters (California, USA) at 408 526-7208 or, in North America, by calling 800 553-NETS(6387).

Documentation Feedback

If you are reading Cisco product documentation on the World Wide Web, you can submit technical comments electronically. Click **Feedback** in the toolbar and select **Documentation**. After you complete the form, click **Submit** to send it to Cisco.

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

To submit your comments by mail, use the response card behind the front cover of your document, or write to the following address:

Cisco Systems, Inc.
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 documentation, troubleshooting tips, and sample configurations from online tools. For Cisco.com registered users, additional troubleshooting tools are available from the TAC website.

Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information and resources at anytime, from anywhere in the world. This highly integrated Internet application is a powerful, easy-to-use tool for doing business with Cisco.

Cisco.com provides a broad range of features and services to help customers and partners streamline business processes and improve productivity. Through Cisco.com, you can find information about Cisco and our networking solutions, services, and programs. In addition, you can resolve technical issues with online technical support, download and test software packages, and order Cisco learning materials and merchandise. Valuable online skill assessment, training, and certification programs are also available.

Customers and partners can self-register on Cisco.com to obtain additional personalized information and services. Registered users can order products, check on the status of an order, access technical support, and view benefits specific to their relationships with Cisco.

To access Cisco.com, go to the following website:

http://www.cisco.com

Technical Assistance Center

The Cisco TAC website is available to all customers who need technical assistance with a Cisco product or technology that is under warranty or covered by a maintenance contract.

Contacting TAC by Using the Cisco TAC Website

If you have a priority level 3 (P3) or priority level 4 (P4) problem, contact TAC by going to the TAC website:

http://www.cisco.com/tac

P3 and P4 level problems are defined as follows:

- P3—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- P4—You need information or assistance on Cisco product capabilities, product installation, or basic product configuration.

In each of the above cases, use the Cisco TAC website to quickly find answers to your questions.

To register for Cisco.com, go to the following website:

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

If you cannot resolve your technical issue by using the TAC online resources, Cisco.com registered users can open a case online by using the TAC Case Open tool at the following website:

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

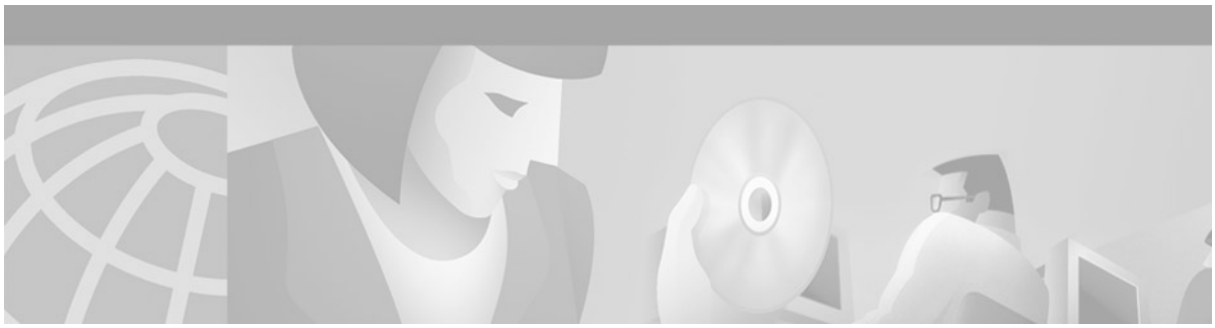
Contacting TAC by Telephone

If you have a priority level 1 (P1) or priority level 2 (P2) problem, contact TAC by telephone and immediately open a case. To obtain a directory of toll-free numbers for your country, go to the following website:

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

P1 and P2 level problems are defined as follows:

- P1—Your production network is down, causing a critical impact to business operations if service is not restored quickly. No workaround is available.
- P2—Your production network is severely degraded, affecting significant aspects of your business operations. No workaround is available.



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.
*abbreviated-command-entry***?**	Provides a list of commands that begin with a particular character string. (No space between command and question mark.)
abbreviated-command-entry<**Tab**>	Completes a partial command name.
?	Lists all commands available for a particular command mode.
command **?**	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

`Router> enable`
`Password: <password>`
`Router#`
	Enter the **enable** command and password to access privileged EXEC commands. You are in privileged EXEC mode when the prompt changes to `Router#`.

`Router# configure terminal`
`Enter configuration commands, one per line. End with CNTL/Z.`
`Router(config)#`
	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)#`.

`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)#`
	Enter interface configuration mode by specifying the serial interface that you want to configure using the **interface serial** global configuration command.
	
	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.
	
	You are in interface configuration mode when the prompt changes to `Router(config-if)#`.

Table 2 How to Find Command Options (continued)

Command	Comment

`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)#`
	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.

`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`
	Enter the command that you want to configure for the interface. This example uses the **ip** command.
	
	Enter **?** to display what you must enter next on the command line. This example shows only some of the available interface IP configuration commands.

Table 2 How to Find Command Options (continued)

Command	Comment

`Router(config-if)# ip address ?`
`  A.B.C.D  IP address`
`  negotiated  IP Address negotiated over PPP`
`Router(config-if)# ip address`
	Enter the command that you want to configure for the interface. This example uses the **ip address** command.
	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.
	A carriage return (<cr>) is not displayed; therefore, you must enter additional keywords or arguments to complete the command.

`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`
	Enter the keyword or argument you want to use. This example uses the 172.16.0.1 IP address.
	Enter **?** to display what you must enter next on the command line. In this example, you must enter an IP subnet mask.
	A <cr> is not displayed; therefore, you must enter additional keywords or arguments to complete the command.

`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`
	Enter the IP subnet mask. This example uses the 255.255.255.0 IP subnet mask.
	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**.
	A <cr> is displayed; you can press **Enter** to complete the command, or you can enter another keyword.

`Router(config-if)# ip address 172.16.0.1 255.255.255.0` `Router(config-if)#`	In this example, Enter is pressed to complete the command.

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:

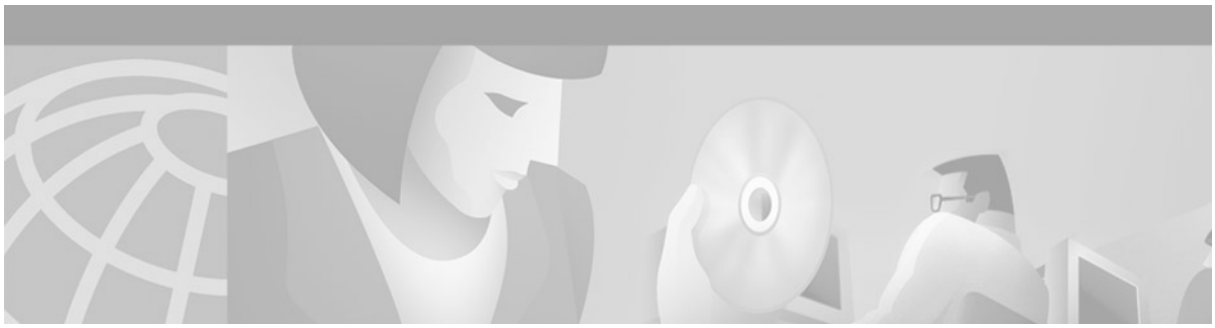
http://www.cisco.com/go/fn

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 231.

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** | **interim update**]

Syntax Description

enable	(Optional) Enables accounting on the APN. When you configure an APN for non-transparent access, this is the default value.
disable	(Optional) Disables accounting on the APN. When you configure an APN for transparent access, this is the default value.
interim update	(Optional) Enables interim accounting records to be sent to an accounting server when a routing area update (resulting in an SGSN change) or QoS change has occurred.

Defaults

enable—For non-transparent APNs

disable—For transparent APNs

Interim accounting is disabled.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.
GGSN 3.1	This command was incorporated in GGSN 3.1 and the ability to enable interim accounting records was added.

Usage Guidelines

You can configure AAA accounting services at an access point. 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

- 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.*

You can verify whether AAA accounting services are configured at an APN using the **show gprs access-point** command.

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

Enabling and Disabling Accounting Services for an Access Point

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.

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

Configuring Interim Accounting for an Access Point

Using the **aaa-accounting interim** access-point configuration command, you can configure the GGSN to send Interim-Update Accounting requests to the AAA server when a routing area update (resulting in an SGSN change) or QoS change has occurred for a PDP context. These changes are conveyed to the GGSN by an Update PDP Context request.

Note Interim accounting support requires that accounting services be enabled for the APN and that the **aaa accounting update newinfo** global configuration command be configured.

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.
server-group	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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
!
```

```
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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

apn-name	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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	Specifies an APN type that is not associated with any specific physical target network on the GGSN.
real	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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.
ip-network-prefix	Dotted decimal notation of the IP network address to be used by the GGSN for route aggregation, in the format *a.b.c.d*.
/mask-bit-length	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 *ip-network-prefix* and the slash (/).
ip-mask	Dotted decimal notation of the IP network mask (in the format *e.f.g.h.*), 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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.

Note 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

username	Alphanumeric string identifying user. The username argument can be only one word. It can contain any combination of numbers and characters.
password	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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, 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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.

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

access-point-index	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 *access-point-index*	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 *tunnel-id*	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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* | **access-point** *access-point-index* | **all**}

Syntax Description

tid *tunnel-id*	Tunnel ID (TID) for which PDP contexts are to be cleared.
imsi *imsi_value*	International Mobile Subscriber Identity (IMSI) value for which PDP contexts are to be cleared.
path *ip-address*	Remote SGSN IP address for which all PDP contexts associated with the SGSN are to be cleared.
access-point *access-point-index*	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

ip-address	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

ip-address	IP address of a DHCP server. The first *ip-address* argument specifies the IP address of the primary DHCP server. The second (optional) *ip-address* 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: • The **vrf** keyword was added. • The *name* 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 Virtual-Template1
 ip address 10.8.0.1 255.255.0.0
 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 address 10.10.10.1 255.255.255.0
 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

list_name	The name of the access-point list.

Defaults

No access-point list is defined.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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:

```
! Virtual Template configuration
interface virtual-template 1
 ip address 10.10.10.1 255.255.255.0
 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

bandwidth-factor	Integer from 1 to 4000000 that specifies the desired bandwidth factor (in bits per second). The default is 10 bits per second.

Defaults

10 bits per second

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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.

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:

```
gprs canonical-qos best-effort bandwidth-factor 20
```

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 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

resource-factor	Integer between 1 and 4294967295 representing an amount of resource that the GGSN calculates internally for canonical QoS processing. The default value is 3145728000.

Defaults

3,145,728,000

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 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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.

Examples

The following example configures a resource factor of 1048576:

```
gprs canonical-qos gsn-resource-factor 1048576
```

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 *tos-value*	ToS mapping for a premium QoS. The *tos-value* can be a number from 0 to 5. A higher number indicates a higher service priority. The default is 2.
normal *tos-value*	ToS mapping for a normal QoS. The *tos-value* can be a number from 0 to 5. A higher number indicates a higher service priority. The default is 1.
best-effort *tos-value*	ToS mapping for a best effort QoS. The *tos-value* 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

deviation_factor	Value that specifies the deviation factor. This value can range from 1 to 1000. The default value is 100.

Defaults

100

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 = 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

cdr-limit	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.

Defaults

255 CDRs

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 the creation of partial CDRs, 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 **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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

minutes	Number of minutes the GGSN waits before retrying a charging request. The default value is 0 minutes, which disables the timer.

Defaults

0 minutes

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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:

```
gprs charging cg-path-requests 5
```

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

number	Integer from 0 to 15. The default value is disabled.

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, with the following changes: • The **no** form of the command was added. • The default value changed from 15 to disabled.
12.2(8)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 SGSNs 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
```

Related Commands

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

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

threshold-value	A value between 1 and 4294967295 that specifies the container threshold value, in bytes. The default is 1,048,576 bytes (1 MB).

Defaults

1,048,576 bytes (1 MB)

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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.

The **gprs charging disable** command is a hidden command in the Cisco IOS software and does not appear when querying the command line interface help using "?".

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 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

tos-value	Specifies a ToS mapping value between 0 and 5. A higher number indicates a higher service priority. The default value is 3.

Defaults

3

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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:

```
gprs charging map data tos 5
```

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

queue-size	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

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

Defaults

UDP

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

Usage Guidelines

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

Examples

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

port-num	Integer from 1024 to 10000. The default port is 3386.

Defaults

Port 3386

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 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.
12.2(8)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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.

There are several scenarios that should be considered for charging for roaming mobile subscribers. The GGSN does not support charging for all roaming scenarios.

Supported Roaming Scenario

The GGSN correctly supports charging in the following roaming scenario:

MS1 is subscribed to PLMN1 and attaches to PLMN1. From PLMN1, MS1 initiates a PDP context with an SGSN in PLMN1 that is connected to our GGSN. In this case MS1 is not a roamer. The MCC and MNC values within the TID should match the MCC and MNC values on the GGSN, and G-CDRs are not created.

Roaming Scenario Restrictions

In the following roaming scenarios, the GGSN does not behave as expected for charging support:

- MS2 is subscribed to PLMN2 and attaches to PLMN1. From PLMN1, MS2 initiates a PDP context with an SGSN in PLMN1 that is connected to our GGSN. In this case MS2 is considered a roamer. The MCC and MNC values within the TID should not match the MCC and MNC values on the GGSN, and G-CDRs are created.

  G-CDRs are created in this scenario even though the SGSN and GGSN reside within the same PLMN. The feature does not work as expected in this scenario.

- MS1 is subscribed to PLMN1 and attaches to PLMN2. From PLMN2, MS1 initiates a PDP context to an SGSN in PLMN1 that is connected to our GGSN. In this case MS1 is also a roamer. However, the MCC and MNC values within the TID match the MCC and MNC values on the GGSN, and G-CDRs are not created. Only S-CDRs are created in the visited PLMN (PLMN2).

  G-CDRs are not created in this scenario even though the MS is roaming in PLMN2. The feature does not work as expected in this scenario.

Note If the charging policy of the service provider is not consistent with this behavior, then you might not want to implement charging for roamers on the GGSN.

Configuration Guidelines

To enable charging for roamers on the GGSN, you must first configure the **gprs mcc mnc** command. The GGSN uses the values that you configure in this command to compare with the tunnel ID (TID) in a create PDP context request. If the values for the MCC and MNC in the TID of a PDP context do not match the values configured on the GGSN, and if the **gprs charging roamers** command is configured, then the GGSN creates a CDR for the PDP context.

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.

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.

Examples

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

```
gprs charging roamers
```

Related Commands

Command	Description
gprs mcc mnc	Configures the mobile country code and mobile network node 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.

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

bytes	Integer from 100 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.
12.2(8)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

Examples

The following example specifies a buffer size of 512 bytes:

```
gprs charging send-buffer 512
```

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

seconds	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.
12.2(8)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

time	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

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 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:

```
gprs charging tariff-time 14:30:00
```

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

seconds	Interval between charging transfers, in seconds. Can be a value between 1 and 4294967295 seconds. The default is 105 seconds.

Defaults

105 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.
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.
server-group	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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.
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

ip-network-prefix	Dotted decimal notation of the IP network address to be used by the GGSN for route aggregation, in the format *a.b.c.d*.
/mask-bit-length	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 *ip-network-prefix* and the slash (/).
ip-mask	Dotted decimal notation of the IP network mask (in the format *e.f.g.h.*), 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

ip-address	IP address of a default gateway.
name	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 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 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

ip-address	IP address of a DHCP server. The first IP address is the name of the primary DHCP server. The second (optional) *ip-address* argument specifies the IP address of a backup DHCP server.
name	Host name of a DHCP server. The second (optional) *name* 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 virtual-template 1
 ip address 10.15.10.1 255.255.255.0
 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 hos**t 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 virtual-template 1
 ip address 10.15.10.1 255.255.255.0
 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
  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

ip-address	IP address of the GSN handling MAP messages with the HLR. The first *ip-address* argument specifies the IP address of the primary GSN. The second (optional) *ip-address* argument specifies the IP address of a backup GSN.
hostname	Host name of the GSN handling MAP messages with the HLR. The second (optional) *name* 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 *tos-value*	ToS mapping for a delay1 class QoS. The *tos-value* can be a number from 0 to 4. The default is 3.
class2 *tos-value*	ToS mapping for a delay2 class QoS. The *tos-value* can be a number from 0 to 4. The default is 2.
class3 *tos-value*	ToS mapping for a delay3 class QoS. The *tos-value* can be a number from 0 to 4. The default is 1.
class-best-effort *tos-value*	ToS mapping for a delaybesteffort class QoS. The *tos-value* 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

max-weight-value	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.

Defaults

8

Command Modes

Global configuration

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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:

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

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 a 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

number	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

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

number	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

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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.

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.

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

size	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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. The GGSN maintains a counter that decrements each time that an error indication message is sent. 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

tos-value	Value between 0 and 7 that specifies the IP ToS mapping. The default value is 5.

Defaults

ToS value 5

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 transfer interval	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

bytes	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

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 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:

```
gprs gtp n3-buffer-size 2048
```

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

requests	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

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

The value of the **gprs gtp n3-requests** command is used for all signaling requests on the GGSN.

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.

Examples

The following example shows the GGSN attempting to send a signaling request 3 times:

```
gprs gtp n3-requests 3
```

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

interval	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 address 10.1.1.1 255.0.0.0
 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

number	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 address 10.1.1.1 255.0.0.0
 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

response-interval	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

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

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

hours	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

Usage Guidelines

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.

You can override the value of the global purge timer using the **session idle-time** access-point configuration command.

Examples

The following example specifies that the GGSN wait for 60 hours before purging idle sessions:

```
gprs idle-pdp-context purge-timer 60
```

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

pdp-contexts	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 node 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 *mcc-num*	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 *mnc-num*	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 263. 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

start-ip	IP address at the beginning of the range.
end-ip	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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.

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

number	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

number	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

apn-index	Integer from 1 to 65535 that identifies a GPRS access point.
ip-address	IP address for the specified IMSI to be used as the PDP address.
imsi	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

number	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

percentage-number	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

Usage Guidelines

Use the **qprs 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:

```
qos map canonical-qos
```

Related Commands

Command	Description
gprs canonical-qos gsn-resource-factor	Specifies a value that is used by the GGSN to calculate the QoS level provided to mobile users.
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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

virtual-server-address	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

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

Usage Guidelines

This command is required if the GGSN is using CEF switching. If the GGSN is *not* 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.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

access-list-number	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 address 172.16.10.1 255.255.255.0
 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 address 172.16.10.1 255.255.255.0
 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

value	(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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 *number*	Maximum number of PPP regenerated sessions allowed at the access point. The default value 65535.
setup-time *seconds*	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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) 3GGP-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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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.

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.

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 interface 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

ip-address	IP address of the external device to which you want to redirect mobile-to-mobile traffic.

Defaults

Disabled

Command Modes

Access-point configuration

Command History

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

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 TPDUs are exiting the same APN. In addition, redirection of TPDUs tunneled by L2TP from the ingress APN to the LNS of the PDN does not occur.

Note Redirection of intermobile traffic does not occur on an ingress APN unless the TPDUs are exiting the same APN. In addition, redirection of TPDUs 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	Specifies the IP address range of a PLMN.
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 TPDUs, 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	Specifies that the source IP address of an upstream TPDU be verified against the address previously assigned an MS.
destination	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.

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 TPDUs 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.

Note The **security verify destination** command is not applied to APNs using VRF. In addition, the verification of destination addresses does not apply to GTP-PPP regeneration or GTP-PPP with L2TP.

Examples

The following example enables the verification of source IP addresses received in upstream TPDUs:

```
security verify source
```

Related Commands

Command	Description
redirect intermobile interface 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

number	Number of hours between 1 and 168.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

access-point-index	Integer (from 1 to 65535) that identifies a GPRS access point. Information about that access point is shown.
access-point-index **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	This command was incorporated in Cisco IOS Release 12.2(4)MX. • The following output fields were added to the display: – 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: – 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: – Access-type – ppp-regeneration (max-session, setup-time) – VRF Name
12.2(8)YD	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.
12.2(8)B	This command was incorporated in Cisco IOS Release 12.2(8)B and the following fields were added to the display: • RADIUS attribute suppress SGSN Address • RADIUS attribute suppress QOS • Security features: – Verify mobile source addr – Verify destination source addr • Traffic redirection: – Mobile-to-mobile
GGSN 3.1	This command was incorporated in GGSN 3.1 and the interim accounting output field was added to the display.

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: non-transparent
    apn-type: Real
    accounting: Enabled
    interim accounting: Enable
    wait_accounting: Enable
    dynamic_address_pool: dhcp-proxy-client
    apn_dhcp_server: 10.99.100.5
    apn_dhcp_gateway_addr: 10.27.1.1
    apn_authentication_server_group: foo
    apn_accounting_server_group: foo1
    apn_username: , apn_password:
    subscribe_required: No
    deactivate_pdp_context_on violation: No
    network_activation_allowed: No
    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: Disabled
    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 3 describes the fields show in the display.

Table 3 show gprs access-point Field Descriptions

Field	Description
accounting	Current status of accounting services at the APN: • 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. You can configure an APN for accounting services using the **aaa-accounting** access-point configuration command.
aggregate	Route aggregation configuration information on the GGSN. 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. The output field may contain the following information: • 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	Current setting for the **access-mode** command: • 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 3 show gprs access-point Field Descriptions (continued)

Field	Description
apn-type	Current setting for the **access-type** command: • 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.
Block Foreign-MS Mode	Current setting for the **block-foreign-ms** command: • 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: • 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.
interim accounting	Indicates whether interim accounting has been enabled on an access point using the **aaa-accounting interim** access point configuration command. Possible values are: • Enable—Interim accounting is enabled. • Diable—Interim accounting is diabled.
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: • 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.

Table 3 show gprs access-point Field Descriptions (continued)

Field	Description
RADIUS attribute suppress IMSI	Current setting for the **radius attribute suppress imsi** command: • 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: • 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: • 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: • 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: • 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: • Enabled—GGSN verifies the source IP address of upstream TPDUs against addresses previously assigned to MSs. • Disabled—GGSN does not verify the source IP address of upstream TPDUs against addresses previously assigned to MSs.

Table 3 show gprs access-point Field Descriptions (continued)

Field	Description
Verify mobile destination addr	Current setting for the **security verify destination** command: • 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: • 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. 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.

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 4 describes the fields show in the display.

Table 4 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       gprs.pdn1.com        vpn1
        ppp-regeneration (max-session: 10000, setup-time: 60)
-----------------------------------------------------------------------
2       non-transparent    Real       gprs.pdn2.com
-----------------------------------------------------------------------
3       transparent        Virtual    corporate
-----------------------------------------------------------------------
```

Table 5 describes the fields show in the display.

Table 5 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: • 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: • 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 5 show gprs access-point all Field Descriptions (continued)

Field	Description
ppp-regeneration (max-session, setup-time)	PPP regeneration session parameters configured at the access point: • 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

access-point-index	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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       gprt.pdn.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
-------------------------------------------------------
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
-------------------------------------------------------
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
```

Table 6 describes the fields shown in the display:

Table 6 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.
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.)

Table 6 show gprs access-point statistics Field Descriptions (continued)

Field	Description
ppp-regeneration (max-session, setup-time)	PPP regeneration session parameters configured at the access point: • 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.
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: • 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: • Charging MCC Code • Charging MNC Code • Charging HPLMN Matching Criteria
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 **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:        <10.9.9.9>
* Default Backup Charging Gateway Address: <10.5.5.5>
* Current Active Charging Gateway Address: <10.9.9.9>
* Current Backup Charging Gateway Address: <10.5.5.5>
* Charging Server Switch-Over Timer:       <15> seconds.
* Charging Path Protocol (0:UDP, 1:TCP):   <0>
* Charging MAP DATA TOS:                   <3>
* Charging Transfer Interval:              <105> seconds.
* Charging Transfer Threshold:             <400> bytes.
* Charging CDR Aggregation Limit:          <1> CDRs per msg.
* Charging Packet Queue Size:              <128> messages.
* Charging Gateway Path Request Timer:     <1> Minutes.
* Charging Change Condition Limit:         <7>
* Charging SGSN Limit:                     <0>
* Charging Send Buffer Size:               <1460>
* Charging Port Number:                    <3386>
* Charging Roamers CDR Only:               DISABLED.
* Charging CDR Option:
 - Local Record Sequence Number:           ENABLED.
 - APN Selection Mode:                     DISABLED.
 - No Partial CDR Generation:              ENABLED.
 - Node ID:                                ENABLED.
 - Packet Count:                           ENABLED.
 - Served MSISDN:                          ENABLED.
 - Private Echo:                           ENABLED.
* Charging Tariff Time Changes:
 - Tariff Time Change (#0):               17:00:00
 - Tariff Time Change (#1):               17:01:00
 - Tariff Time Change (#2):               17:02:00
 - Tariff Time Change (#3):               17:03:00
 - Tariff Time Change (#4):               17:04:00
 - Tariff Time Change (#5):               17:05:00
 - Tariff Time Change (#6):               21:25:00
 - Tariff Time Change (#7):               21:25:01
 - Tariff Time Change (#8):               21:25:03
 - Tariff Time Change (#9):               21:25:04
 - Tariff Time Change (#10):               21:25:05
 - Tariff Time Change (#11):               21:27:35
 - Tariff Time Change (#12):               21:27:40
```

Table 7 describes the fields shown in the display.

Table 7 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.
Charging CDR Option : Served MSISDN	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. You can enable the GGSN to provide the MSISDN number using the **gprs charging cdr-option served-msisdn** command.

Table 7 show gprs charging parameters Field Descriptions (continued)

Field	Description
Charging CDR Option : Private Echo	Status indicating if the GGSN uses private echo signaling for flow control. The possible values are enabled or disabled. You can enable private echo signaling using the **gprs charging flow-control private-echo** command.
Charging Change Condition Limit	Maximum number of charging containers in each G-CDR. You can configure the change condition limit using the **gprs charging container change-limit** command.
Charging Gateway Path Request Timer	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. You can configure the path request timer using the **gprs charging cg-path-requests** command.
Charging MAP DATA TOS	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. You can configure the ToS mapping using the **gprs charging map data tos** command.
Charging Packet Queue Size	Maximum number of unacknowledged charging data transfer requests that the GGSN maintains in its queue. You can configure the maximum queue size using the **gprs charging packet-queue-size** command.
Charging Path Protocol (0:UDP, 1:TCP)	Binary value representing the protocol in use between the GGSN and the charging gateway. When 0, UDP is in use; when 1, TCP is in use. 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 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.

Table 7 show gprs charging parameters Field Descriptions (continued)

Field	Description
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.
Charging Transfer Threshold	Maximum size (in bytes) that the GGSN maintains in a charging container before closing it and updating the CDR. You can configure the container volume using the **gprs charging container volume-threshold** command.
Current Active Charging Gateway Address	IP address of the charging gateway to which the GGSN is currently sending charging data. You can configure the primary charging gateway using the **gprs default charging-gateway** command.
Current Backup Charging Gateway Address	IP address of the backup charging gateway to which the GGSN will send charging data if the current active charging gateway becomes unavailable. You can configure the backup charging gateway using the **gprs default charging-gateway** command.
Default Backup Charging Gateway Address	IP address of the default secondary, or backup, charging gateway. You can configure the default backup charging gateway using the **gprs default charging-gateway** command.
Default Charging Gateway Address	IP address of the default primary charging gateway. You can configure the default primary charging gateway using the **gprs default charging-gateway** command.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 8 describes the fields shown in the display.

Table 8 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 statistics about the transfer of charging packets between the GGSN and charging gateways.

show gprs charging status

To display current statistics about the transfer of charging packets between the GGSN and charging gateways, use the **show gprs charging status** privileged EXEC command.

show gprs charging status {**tid** *tunnel_id* | **access-point** *access-point-index* | **all**}

Syntax Description

tid *tunnel_id*	Specifies a tunnel ID for which you want to display charging statistics.
access-point *access-point-index*	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

Usage Guidelines

Use the **show gprs charging status** command to display current statistics for the transfer of charging packets between the GGSN and charging gateways 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 9 describes the fields shown in the display.

Table 9 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 10 describes the fields shown in the display.

Table 10 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 11 describes the fields shown in the display.

Table 11 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 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

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: • 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: • GTP max hold time for old sgsn 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: • GPRS HPLMN Matching Criteria
12.2(8)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 12 describes the fields shown in the display.

Table 12 show gprs gtp parameters Field Descriptions

Field	Description
GPRS MCC Code	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. You can configure the MCC using the **gprs mcc mnc** command.
GPRS MNC Code	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. You can configure the MNC using the **gprs mcc mnc** command.
GTP buffer size for receiving N3_buffer	Current size of the receive buffer (in bytes) that the GGSN uses to receive GTP signaling messages and packets sent through the tunneling protocol. You can configure the N3 buffer using the **gprs gtp n3-buffer-size** command.
GTP dynamic echo-timer minimum	Current minimum time period (in seconds) used by the dynamic echo timer. You can configure the minimum value using the **gprs gtp echo-timer dynamic minimum** command.
GTP dynamic echo-timer smooth factor	Current multiplier used by the GGSN to calculate the T-dynamic for the dynamic echo timer. You can configure the smooth factor using the **gprs gtp echo-timer dynamic smooth-factor** command.
GTP max pdp context	Current maximum number of PDP contexts (mobile sessions) that can be activated on the GGSN. You can configure the maximum number of PDP context requests using the **gprs maximum-pdp-context-allowed** command.

Table 12 show gprs gtp parameters Field Descriptions (continued)

Field	Description
GTP max retry N3_request	Maximum number of times that the GGSN attempts to send a signaling request to an SGSN. You can configure the maximum number of signaling requests made by the GGSN using the **gprs gtp n3-requests** command.
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 {*ip-address* | **all**}

Syntax Description

ip-address	Displays GTP path information for a specified IP address.
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: • Dynamic echo timer
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 **show gprs gtp path** command to display information about one or more GTP paths from the GGSN.

Examples

The following is sample output of the **show gprs gtp path all** command:

```
router# show gprs gtp path all
         Total number of path : 2

Path pointer         Local address        Remote address     Dynamic echo timer
 0x63100440         10.41.41.1            10.18.18.200           5
 0x616378D0         10.10.10.1            10.10.10.4             2
```

The following is sample output of the **show gprs gtp path** command:

```
router# show gprs gtp path 10.49.85.100
Path pointer         Local address        Remote address     Dynamic echo timer
0x63100440          10.41.41.1            10.18.18.200           5
```

Table 13 describes the fields shown in the display.

Table 13 show gprs gtp path Field Descriptions

Field	Description
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	The local address for the path.
Path pointer	The value of the GGSN internal pointer to the GTP path, in hexadecimal.
Remote address	Address of the remote end of the path.
Total number of paths	Total number of GTP paths.

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** *hex-data* | **imsi** *hex-data* | **path** *ip-address* | **access-point** *access-point-index* | **pdp-type** {**ip** | **ppp**} | **qos-precedence** {**low** | **normal** | **high**} | **qos-delay** {**class1** | **class2** | **class3** | **classbesteffort**} | **all**}

Syntax Description

tid *hex-data*	Displays PDP contexts by tunnel ID. Enter the TID in hexadecimal format.
imsi *hex-data*	Displays PDP contexts by International Mobile Subscriber Identity (IMSI). Enter the IMSI in hexadecimal format.
access-point *access-point-index*	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-precedence	Displays PDP contexts for a specified GPRS quality of service precedence type. You can specify the following precedence types: **low**, **normal**, and **high**.
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**.
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.

Release	Modification
12.2(4)MX	This command was incorporated in Cisco IOS Release 12.2(4)MX. • 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: – 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: – 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: – 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.
12.2(8)YD	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: • primary dns • secondary dns • primary nbns • secondary nbns
12.2(8)B	This command was incorporated in Cisco IOS Release 12.2(8)B and the cef_drop field was removed from the output display of the **tid** version of this command.

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, 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 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 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 14 describes the fields shown in the display.

Table 14 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.

Table 14 show gprs gtp pdp-context all Field Descriptions (continued)

Field	Description
Source	Source of IP addressing for the MS. The possible values are: • 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:

```
router#show gprs gtp pdp 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           ggsn_addr_signal:10.8.0.1
    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
    mnrgflag:         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_byte_count:     0             rcv_pkt_count:  0
    send_byte_count:    0             send_pkt_count: 0
```

```
cef_up_pkt:         0             cef_up_byte:    0
cef_down_pkt:       0             cef_down_byte:  0
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 15 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 15 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: • 01—Best effort • 02—Normal • 03—Premium
canonical Qos class (req.)	Requested canonical quality of service class by the PDP context, with the following values: • 01—Best effort • 02—Normal • 03—Premium
cef_down_byte	Total number of G-PDU bytes received and successfully processed in the CEF path on the downlink, from the GGSN to the SGSN.
cef_down_pkt	Total number of G-PDU packets received and successfully processed in the CEF path on the downlink, from the GGSN to the SGSN.
cef_up_byte	Total number of G-PDU bytes received and successfully processed in the CEF path on the uplink, from the SGSN to the GGSN.
cef_up_pkt	Total number of G-PDU packets received and successfully processed in the CEF path on the uplink, from the SGSN to the GGSN.

Table 15 show gprs gtp pdp-context tid Field Descriptions (continued)

Field	Description
charging_id	Unique 4-octet value generated by the GGSN for the PDP context. The value 0 is reserved.
current time	Date and time of the show command output.
downstream_data_flow	Flow label of downlink G-PDUs.
downstream_signal_flow	Flow label of downlink signaling messages.
effective bandwidth	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. **Note** The effective bandwidth does not represent actual bandwidth usage.
ggsn_addr_signal	IP address of the GGSN.
gprs qos_neg	Negotiated quality of service for the PDP context. The field is in the format *vwxyzz*, which represents the following QoS classes (as defined in the GSM specifications for quality of service profiles): • *v*—Delay class • *w*—Reliability class • *x*—Peak throughput class • *y*—Precedence class • *zz*—Mean throughput class **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 *Cisco IOS Mobile Wireless Configuration Guide*.

Table 15 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 *vwxyzz*, which represents the following QoS classes (as defined in the GSM specifications for quality of service profiles): • *v*—Delay class • *w*—Reliability class • *x*—Peak throughput class • *y*—Precedence class • *zz*—Mean throughput class **Note** See the Note in the description of the gprs qos_neg output field above.
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.
mnrgflag	Mobile not reachable flag, with the following values: • 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.
ntwk_init_pdp	Network initiated PDP context indicator, with the following values: • 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.
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.

Table 15 show gprs gtp pdp-context tid Field Descriptions (continued)

Field	Description
primary dns	IP address of the primary DNS server.
primary nbns	IP address of the primary NetBIOS Name Service (NBNS).
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.
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 sgsn_addr_signal	IP address of the SGSN that is processing the packets.
signal_sequence	Last sequence number used in the GTP signaling message.
Source	Source of IP addressing for the MS. The possible values are: • 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.
tos mask map	ToS value in IP header of this PDP context.
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 16 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 16 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.
MNRG Flag	Mobile not reachable flag, with the following values: • 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: • 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.” 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.
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: • 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: • 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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         1
  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    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     4              snd_signalling_msg         8
  rcv_pdu_msg            0              snd_pdu_msg                1
  rcv_pdu_bytes          0              snd_pdu_bytes              100
  total created_pdp      1              total deleted_pdp          0
  total created_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 1
```

Table 17 describes the fields shown in the display:

Table 17 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.
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.
ntwk_init_pdp_act_rej	Number of rejected PDP context requests that were initiated by the network (PDN).

Table 17 show gprs gtp statistics Field Descriptions (continued)

Field	Description
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.
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.
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_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.

Table 17 show gprs gtp statistics Field Descriptions (continued)

Field	Description
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: • 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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
```

Table 18 describes the fields shown in the display.

Table 18 show gprs gtp status Field Descriptions

Field	Description
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.
qos_delay3_pdp	Current number of active PDP contexts that are classifed 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.

Table 18 show gprs gtp status Field Descriptions (continued)

Field	Description
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

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 *hex-data*	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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           corporatec.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 19 describes the fields shown in the displays:

Table 19 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 19 show gprs gtp-director pending-request Field Descriptions (continued)

Field	Description
APN-NAME	APN name specified in the original create PDP context request from the SGSN. **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.
DOMAIN-NAME	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. **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.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 20 describes the fields shown in the display.

Table 20 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 21 describes the fields shown in the display.

Table 21 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.

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

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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

vrf-name	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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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.

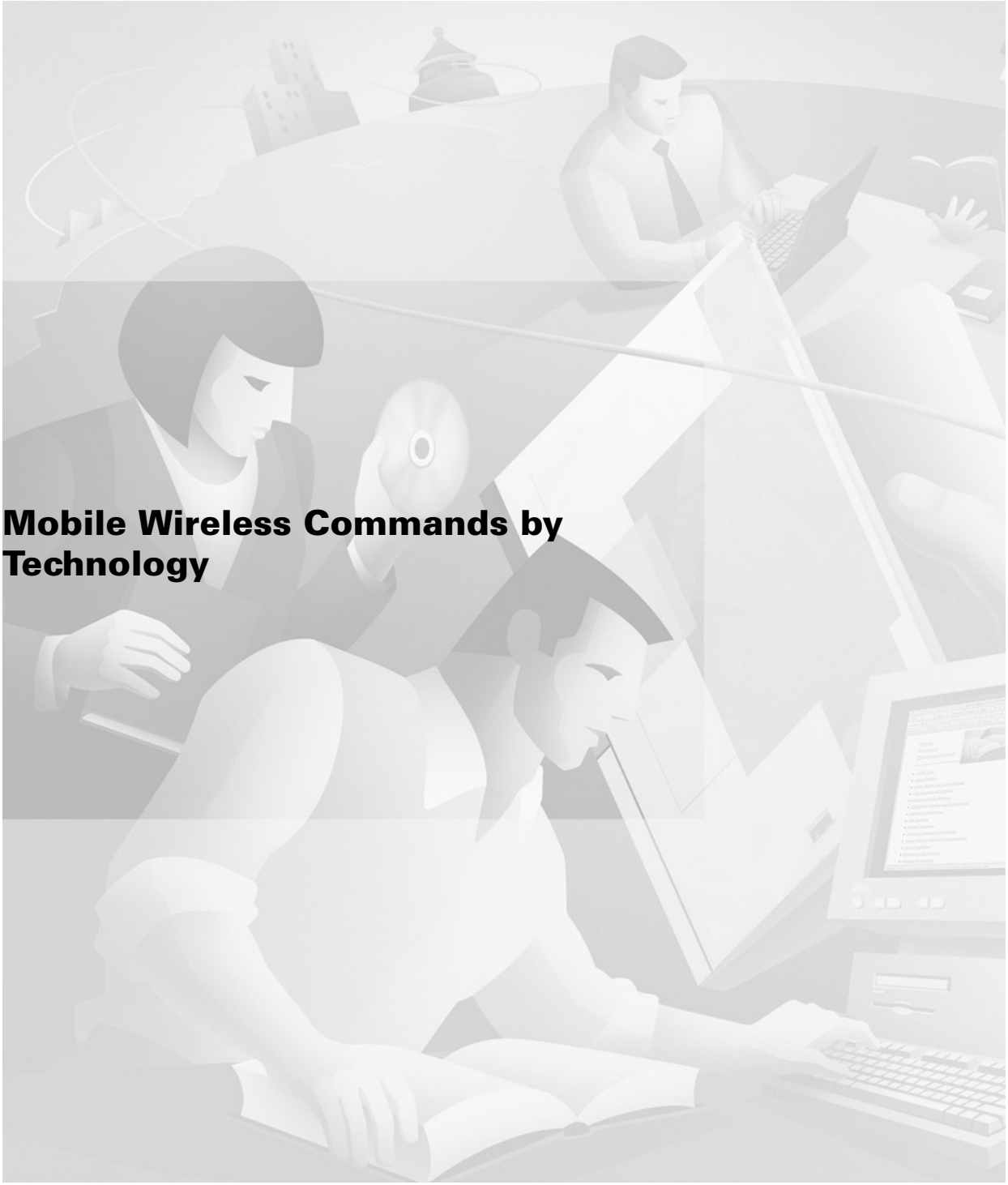
The DHCP server at access-point 2 also is configured to support VRF. Notice that access-point 1 uses the same DHCP server, but is not supporting the VRF address space. The IP addresses for access-point 1 will apply to the global routing table:

```
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 Virtual-Template1
 ip address 10.8.0.1 255.255.0.0
 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
```

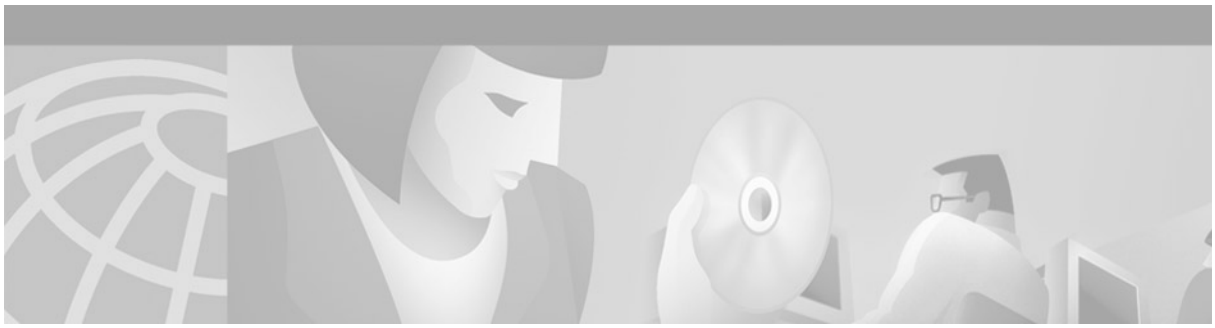
```
!
gprs default ip-address-pool dhcp-proxy-client
gprs gtp ip udp ignore checksum
!
radius-server host 10.2.3.4 auth-port 1645 acct-port 1646 non-standard
radius-server host 10.6.7.8 auth-port 1645 acct-port 1646 non-standard
radius-server key ggsntel
```

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:

Replaced Commands

Table 22 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:

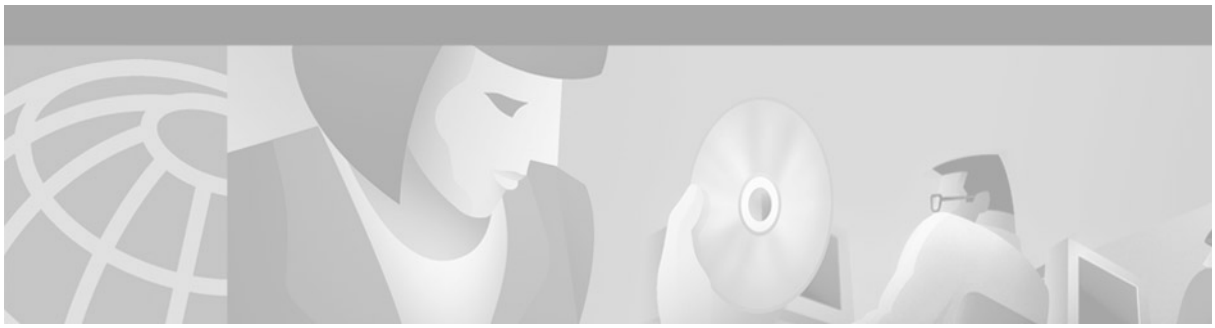
Table 22 GGSN Commands with New Syntax

Old Command Syntax	New Command Syntax
block-roamer	block-foreign-ms

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

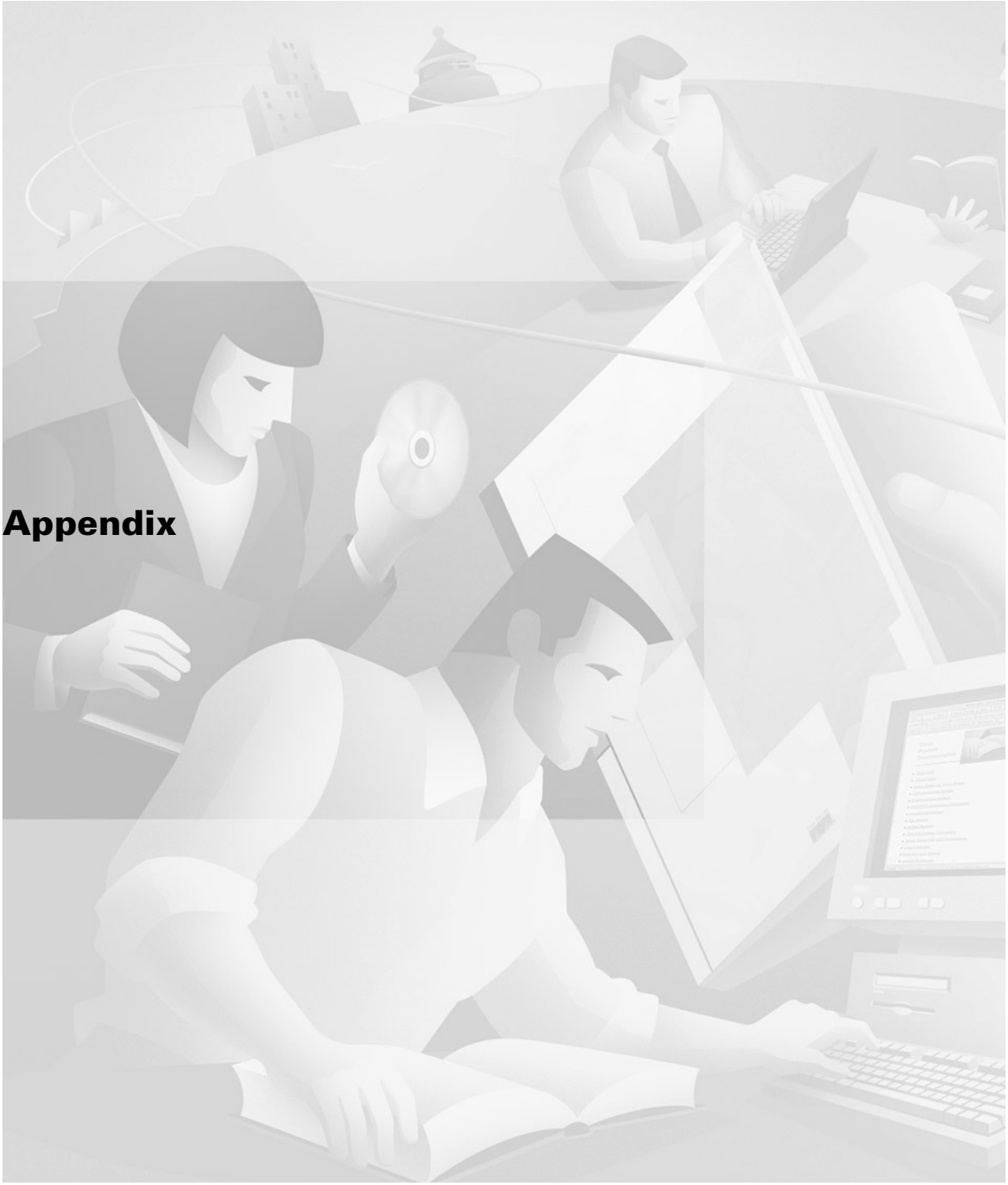
The Cisco IOS GTP Director Module (GDM) provides virtual APN and server load balancing services to non-Cisco GGSNs in a GPRS network. This chapter provides a reference list for all of the GDM commands in the Cisco IOS software that are documented in this book.

For GDM configuration tasks and examples, refer to the *Cisco IOS Mobile Wireless Configuration Guide*.

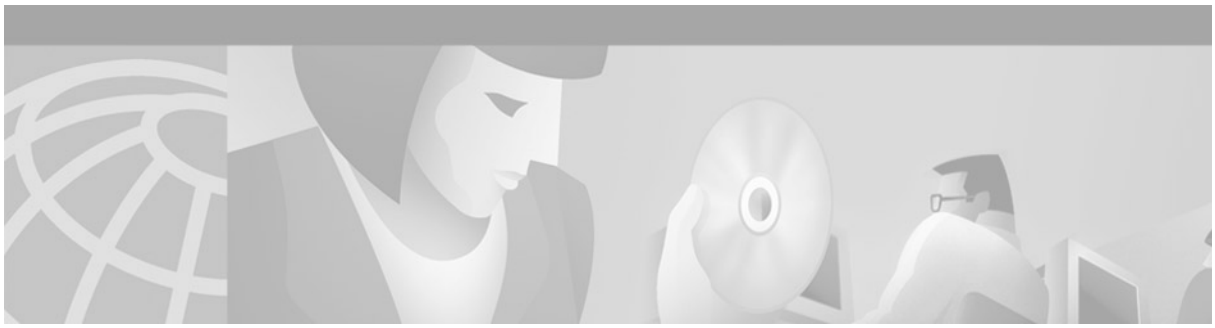
Note The **encapsulation gtp** command is used in both GGSN and GTP director configuration under the virtual template interface. However, a router cannot be configured to support both GGSN and GTP director services at the same time.

The following GDM commands are documented in this book:

- clear gprs gtp-director statistics, page 32
- debug gprs gtp-director, page 247
- debug gprs gtp parsing, page 253
- encapsulation gtp, page 39
- gprs gtp-director retry-timeout, page 105
- service gprs gtp-director, page 173
- show gprs gtp-director pending-request, page 221
- show gprs gtp-director statistics, page 224



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

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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
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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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 Fa1/0: 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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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:1011111111500001:Authen: PAP username: tomy1@corporate_1.com
06:24:02: GPRS:1011111111500001:Session timer started
06:24:02: GPRS:Processing PPP regen reqQ
06:24:02: GPRS:1011111111500001:Processing Initiate PPP  regen from reqQ
06:24:02: GPRS:1011111111500001: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:1011111111500001:state [IDLE->AUTHORIZING] on event [REQUEST PPP REGEN]
06:24:02: GPRS:1011111111500001:Got VPN authorization info
06:24:02: GPRS:1011111111500001: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:1011111111500001:state [AUTHORIZING->VPDN CONNECTING] on event [AUTHOR
SUCCESS]
06:24:02: GPRS:1011111111500001:Author succeeded, establishing the tunnel
06:24:02: GPRS:1011111111500001:Create/Clone vaccess to negotiate PPP
06:24:02: GPRS:1011111111500001:no need to set NS ppp_config
06:24:02: GPRS:1011111111500001:MS no static IP addr. Get one via IPCP
06:24:02: GPRS:1011111111500001:VPDN to inform PPP regen: CONNECTED
06:24:02: GPRS:1011111111500001: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:1011111111500001:state [VPDN CONNECTING->PPP NEGOTIATING] on event [VPDN
CONNECTED]
06:24:02: GPRS:1011111111500001:Start PPP negotiations on vaccess
06:24:02: %LINK-3-UPDOWN: Interface Virtual-Access2, changed state to up
06:24:02: GPRS:1011111111500001:IPCP is up
06:24:02: GPRS:1011111111500001:LNS allocates 10.100.1.1 for MS
06:24:02: GPRS:1011111111500001:IP addr 10.100.1.1 is negotiated for MS
06:24:02: GPRS:1011111111500001:PPP connected
06:24:02: GPRS:1011111111500001: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:1011111111500001: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)B	This command was incorporated in Cisco IOS Release 12.2(8)B.

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
```

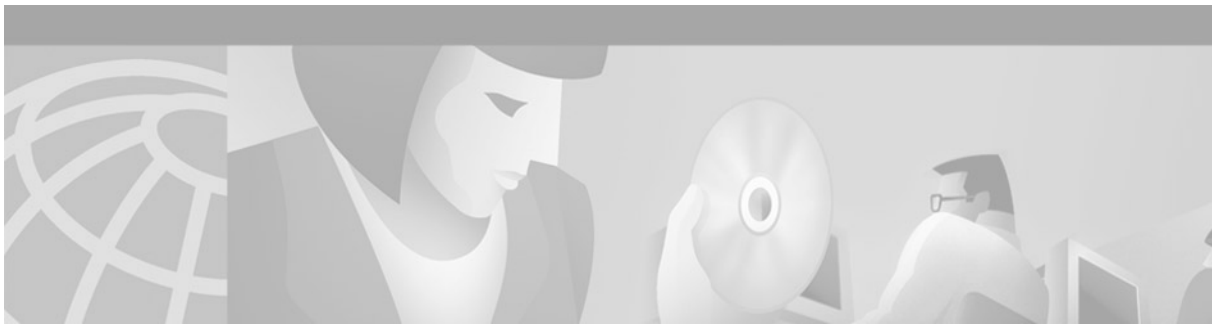


Table of MCC and MNC Codes

Table 23 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 23 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
Azerbaidjan	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 23 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 Telefonia	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 23 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 23 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
	Spacetel	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 23 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 23 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 23 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 23 List of Some Established MCC and MNC Values

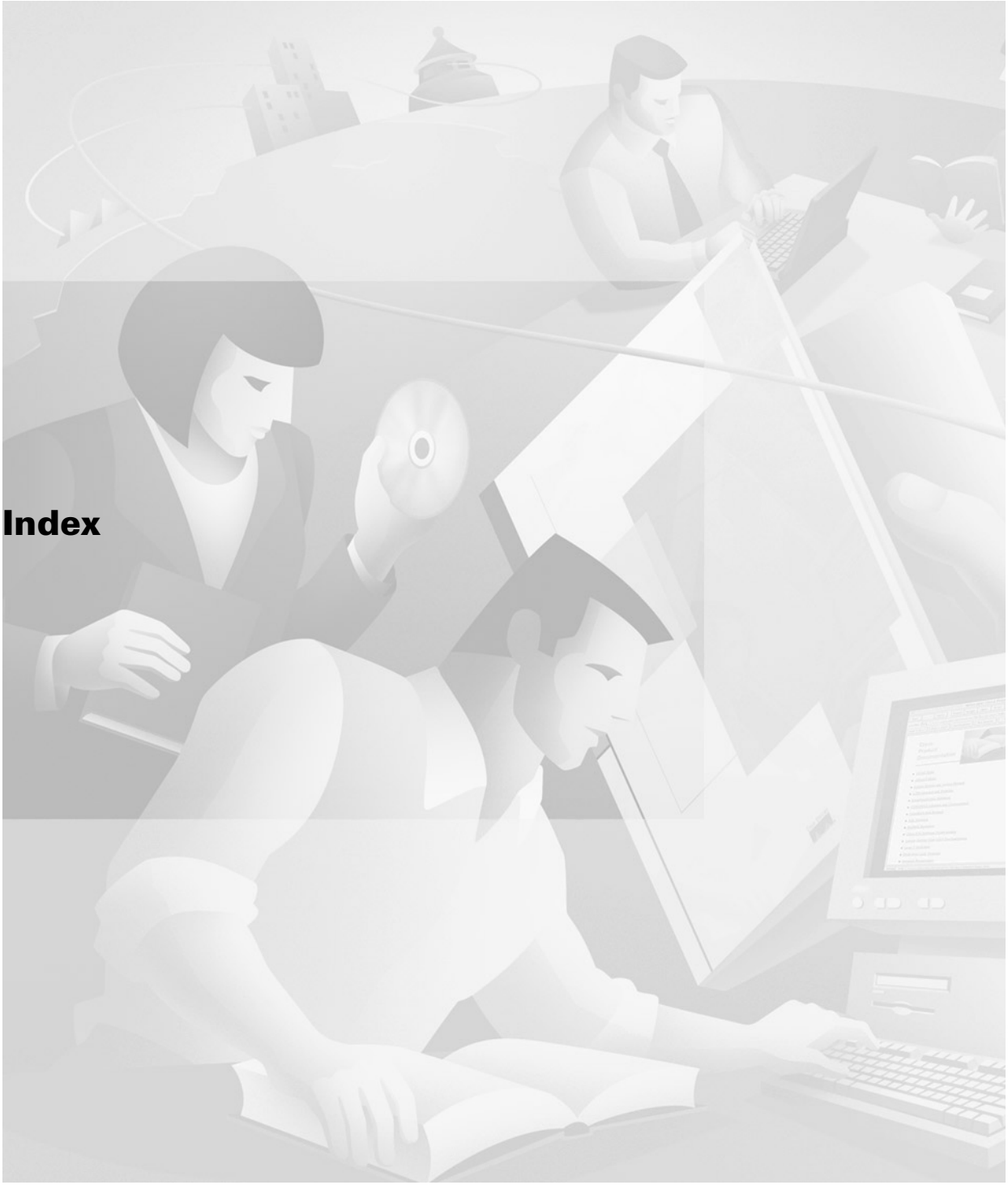
Country	Service Provider Name	MCC MNC
Portugal	Telecel	268 01
	TMN	268 06
	Main Road Telecoms	268
	Optimus	268 03
Qatar	Q-Net	427 01
Romania	MobiFon	226 01
	MobilRom	226 10
Russia	Mobile Tele... Moscow	250 01
	United Telecom Moscow	250
	NW GSM, St. Petersburg	250 02
	Dontelekom	250 10
	KB Impuls	250 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 23 List of Some Established MCC and MNC Values

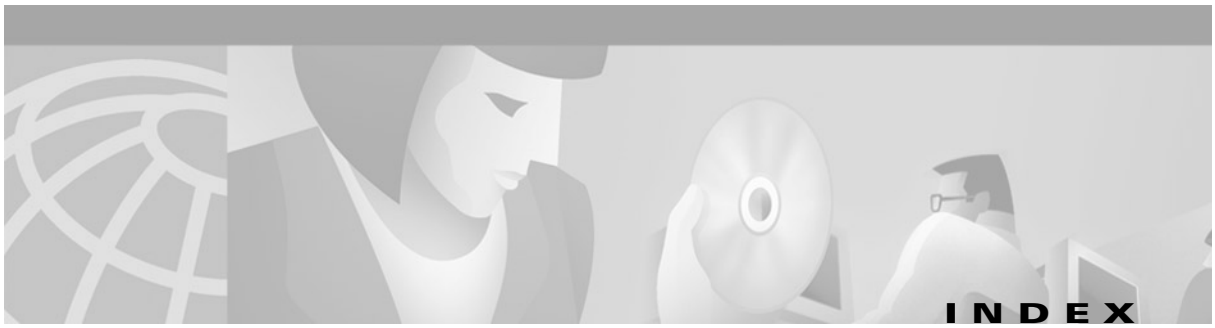
Country	Service Provider Name	MCC MNC
Sri Lanka	MTN Networks Pvt Ltd	413 02
Spain	Airtel	214 01
	Telefonica Spain	214 07
	Amena	214 03
Sudan	Mobitel	634 01
Swaziland		653
Sweden	Comviq	240 07
	Europolitan	240 08
	Telia Mobile	240 01
Switzerland	Swisscom 900	228 01
	Swisscom 1800	228 01
	diAx mobile	228 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 23 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



Index



B1R	Cisco IOS Bridging and IBM Networking Command Reference, Volume 1 of 2
B2R	Cisco IOS Bridging and IBM Networking Command Reference, Volume 2 of 2
DR	Cisco IOS Dial Technologies Command Reference
FR	Cisco IOS Configuration Fundamentals Command Reference
IP1R	Cisco IOS IP Command Reference, Volume 1 of 3: Addressing and Services
IP2R	Cisco IOS IP Command Reference, Volume 2 of 3: Routing Protocols
IP3R	Cisco IOS IP Command Reference, Volume 3 of 3: Multicast
IR	Cisco IOS Interface Command Reference
MWR	Cisco IOS Mobile Wireless Command Reference
P2R	Cisco IOS AppleTalk and Novell IPX Command Reference
P3R	Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Command Reference
QR	Cisco IOS Quality of Service Solutions Command Reference
SR	Cisco IOS Security Command Reference
TR	Cisco IOS Terminal Services Command Reference
VR	Cisco IOS Voice, Video, and Fax Command Reference
WR	Cisco IOS Wide-Area Networking Command Reference
XR	Cisco IOS Switching Services Command Reference

Symbols

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