



**Cisco IOS  
Mobile Wireless  
Command Reference**

Release 12.2

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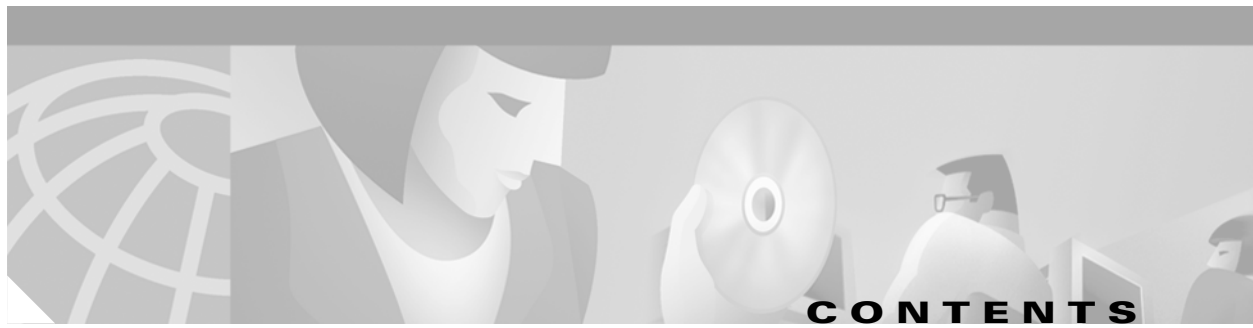
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**Mobile Wireless Commands** MWR-1

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**MOBILE WIRELESS COMMANDS BY TECHNOLOGY**

**GPRS GGSN Command Set** MWR-103

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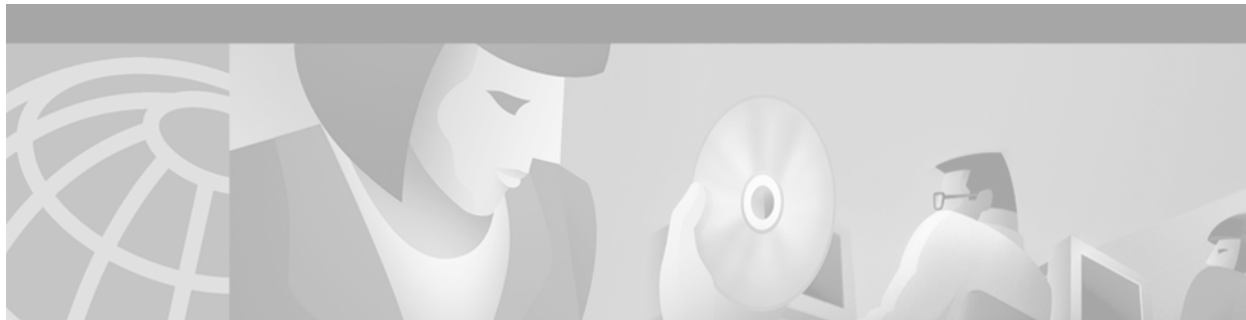
**APPENDIX**

**SGSN D-Node Commands** MWR-109

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## About Cisco IOS Software Documentation

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

### Documentation Objectives

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

### Audience

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

### Documentation Organization

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

### Documentation Modules

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

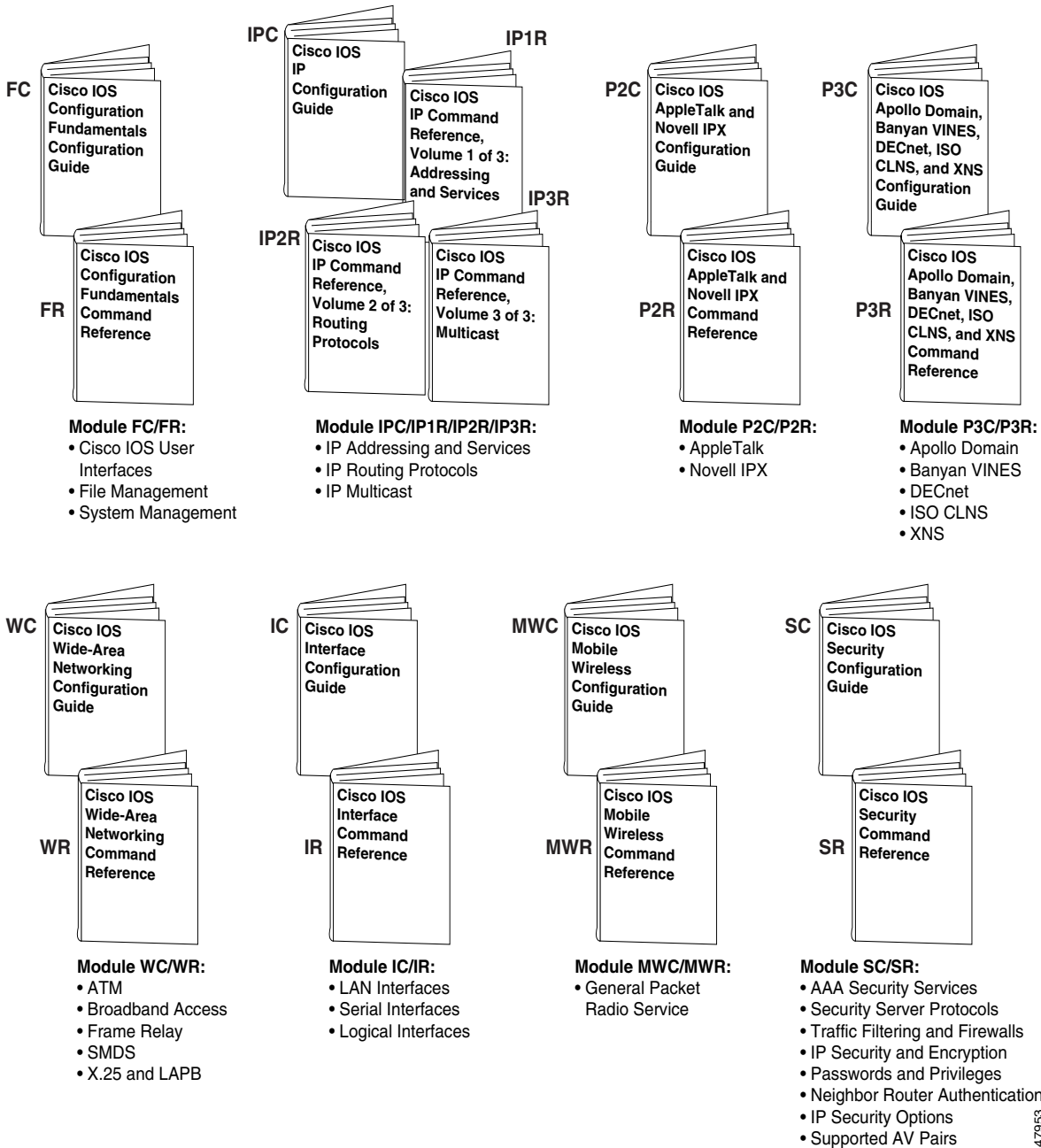
Figure 1 shows the Cisco IOS software documentation modules.



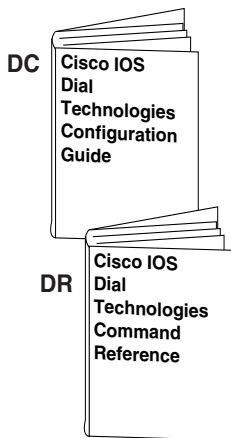
**Note**

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

**Figure 1 Cisco IOS Software Documentation Modules**

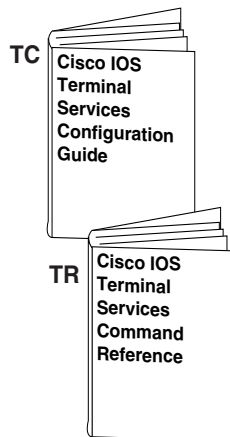


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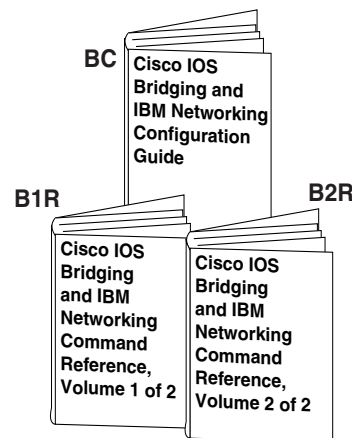
**Module DC/DR:**

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



**Module TC/TR:**

- ARA
- LAT
- NAS1
- Telnet
- TN3270
- XRemote
- X.28 PAD
- Protocol Translation

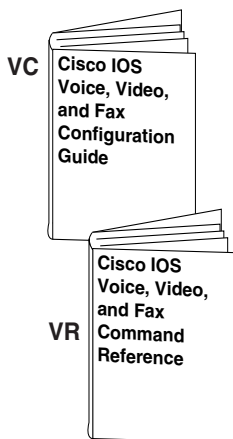


**Module BC/B1R:**

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

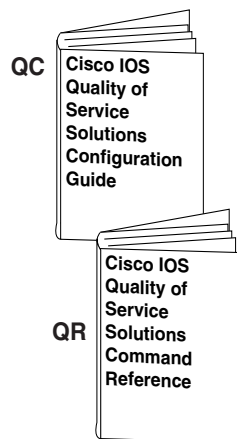
**Module BC/B2R:**

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



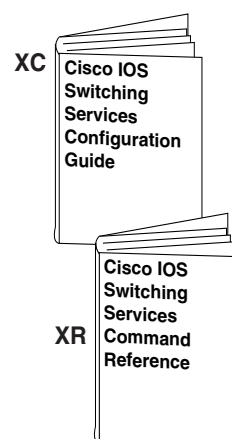
**Module VC/VR:**

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



**Module QC/QR:**

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



**Module XC/XR:**

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

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## Master Indexes

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

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

## Supporting Documents and Resources

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

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

# Document Conventions

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

The Cisco IOS documentation set uses the following conventions:

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

Command syntax descriptions use the following conventions:

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

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

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

Examples use the following conventions:

Convention	Description
screen	Examples of information displayed on the screen are set in Courier font.
<b>boldface screen</b>	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](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](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](mailto: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:

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Document Resource Connection  
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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>

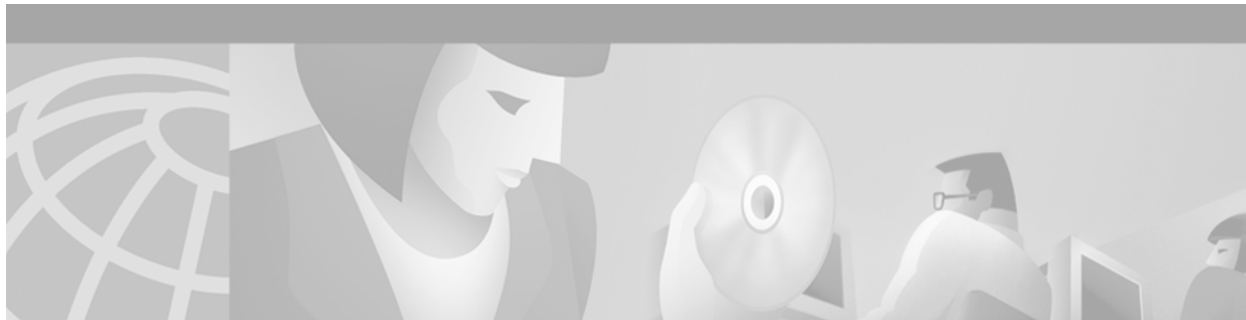
### Contacting TAC by Telephone

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

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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 <b>logout</b> command.
Privileged EXEC	From user EXEC mode, use the <b>enable</b> EXEC command.	Router#	To return to user EXEC mode, use the <b>disable</b> command.
Global configuration	From privileged EXEC mode, use the <b>configure terminal</b> privileged EXEC command.	Router(config)#	To return to privileged EXEC mode from global configuration mode, use the <b>exit</b> or <b>end</b> command, or press <b>Ctrl-Z</b> .
Interface configuration	From global configuration mode, specify an interface using an <b>interface</b> command.	Router(config-if)#	To return to global configuration mode, use the <b>exit</b> command. To return to privileged EXEC mode, use the <b>end</b> command, or press <b>Ctrl-Z</b> .
ROM monitor	From privileged EXEC mode, use the <b>reload</b> EXEC command. Press the <b>Break</b> key during the first 60 seconds while the system is booting.	>	To exit ROM monitor mode, use the <b>continue</b> 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
<b>help</b>	Provides a brief description of the help system in any command mode.
<i>abbreviated-command-entry?</i>	Provides a list of commands that begin with a particular character string. (No space between command and question mark.)
<i>abbreviated-command-entry</i> <Tab>	Completes a partial command name.
<b>?</b>	Lists all commands available for a particular command mode.
<i>command ?</i>	Lists the keywords or arguments that you must enter next on the command line. (Space between command and question mark.)

## Example: How to Find Command Options

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

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

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

**Table 2** How to Find Command Options

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

Table 2 How to Find Command Options (continued)

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

**Table 2** How to Find Command Options (continued)

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

## Using the no and default Forms of Commands

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

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

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

## Saving Configuration Changes

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

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

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

```
[OK]
Router#
```

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

## Filtering Output from the show and more Commands

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

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

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

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

```
Router# show interface | include protocol

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

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

# Identifying Supported Platforms

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

- Using Feature Navigator
- Using Software Release Notes

## Using Feature Navigator

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

Feature Navigator is available 24 hours a day, 7 days a week. To access Feature Navigator, you must have an account on Cisco.com. If you have forgotten or lost your account information, e-mail the Contact Database Administration group at [cdbadmin@cisco.com](mailto: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>

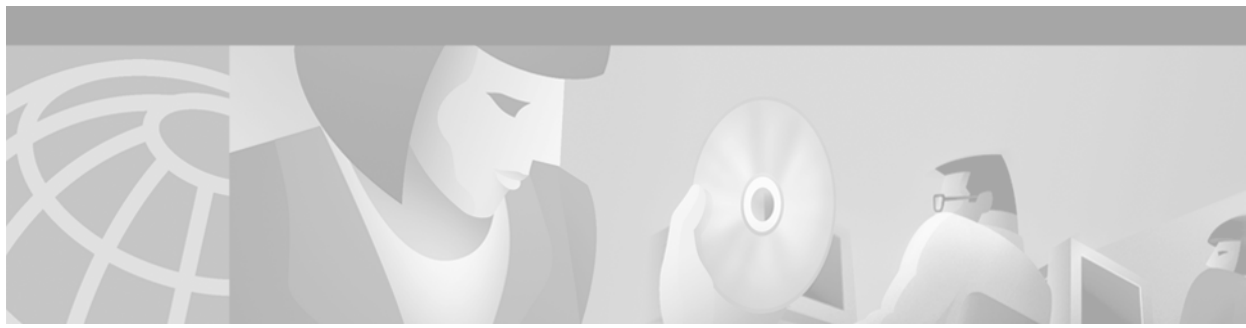
## Using Software Release Notes

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.





## Mobile Wireless Commands

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This book documents all of the Cisco IOS software commands for the mobile wireless technologies in alphabetical order. To locate the group of commands documented for a particular technology area, such as General Packet Radio Service (GPRS), see the chapter, [“GPRS GGSN Command Set”](#).

# 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, use the **no** form of the command.

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

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

## Syntax Description

<b>transparent</b>	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.
<b>non-transparent</b>	Specifies that 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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## 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.

## Examples

The following example specifies non-transparent access to the PDN through an access point associated with a specified virtual template:

```
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
```

**Related Commands**

Command	Description
<a href="#">access-point</a>	Specifies an access-point number and enters access-point configuration mode.

# access-point

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

**access-point** *ap\_number*

**no access-point** *ap\_number*

<b>Syntax Description</b>	<i>ap_number</i>	Integer from 0 to 4,294,967,295 ( $2^{32}-1$ ) that identifies a GPRS access point.
---------------------------	------------------	---

<b>Defaults</b>	No default behavior or values.
-----------------	--------------------------------

<b>Command Modes</b>	Access-point list configuration
----------------------	---------------------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.	

<b>Usage Guidelines</b>	Use the <b>access-point</b> command to create an access point to a PDN. You can specify access point numbers in any sequence.
-------------------------	--



**Note**

Memory and performance issues might occur if you define a large number of access points.
--

<b>Examples</b>	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
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">access-point-name</a>	Specifies the network (or domain) name for a PDN that users can access from the GGSN at a defined access point.

# 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 delete a current access point name, use the **no** form of the command.

**access-point-name** *apn\_name*

**no access-point-name** *apn\_name*

## Syntax Description

<i>apn_name</i>	Specifies the network or domain name for a 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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## 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, acme.com.

## Examples

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

```
access-point 1
  access-point-name acme.com
exit
```

## Related Commands

Command	Description
<a href="#">access-point</a>	Specifies an access point number and enters access-point configuration mode.

# access-violation

To specify the action to take when a user attempts unauthorized access to a PDN through an access point, use the **access-violation** access-point configuration command. To restore the default value for the command, use the **no** form of the command.

```
access-violation { discard-packets | deactivate-pdp-context }
```

```
no access-violation { discard-packets | deactivate-pdp-context }
```

## Syntax Description

<b>discard-packets</b>	Specifies that user packets are discarded when an unauthorized access attempt is detected.
<b>deactivate-pdp-context</b>	Specifies that the user's session is ended when an unauthorized access attempt is detected.

## Defaults

**discard-packets**

## Command Modes

Access-point configuration

## Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## Usage Guidelines

Use the **access-violation** command to specify the action that is taken if a user attempts unauthorized access through the specified access point. The default keyword, **discard-packets**, specifies that the GGSN simply drops user packets when an unauthorized access is attempted. If you specify **deactivate-pdp-context**, the user's session is terminated when unauthorized access is attempted.

## Examples

The following example shows deactivation of a user's access:

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

## Related Commands

Command	Description
<a href="#">access-point-name</a>	Specifies the network (or domain) name for a PDN that users can access from the GGSN at a defined access point.

# 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 {tid tunnel-id | access-point access-point-index | all}
```

Syntax Description	Parameter	Description
	<b>tid</b> <i>tunnel-id</i>	Tunnel ID of the connection for which to clear charging CDRs.
	<b>access-point</b> <i>access-point-index</i>	Specifies clearing the CDRs for a specified access-point index.
	<b>all</b>	Specifies clearing all CDRs on the GGSN.

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**Usage Guidelines** Use the **clear gprs charging cdr** command to clear the CDRs for one or more PDP contexts. The **clear gprs charging cdr** command is normally used before disabling the charging function.

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

To clear CDRs by access point, first issue the **show gprs access-point** command to obtain a list of the access points, and then issue the **clear gprs charging cdr** 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 issue 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.

**Examples**

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

```
router# show gprs gtp pdp-context all

TID           MS_ADDR      dynamic?     GGSN_addr    APN
1111111111111111  2.0.0.1      0            1.1.1.1      gprs.somewhere.com
3333333333333333  10.10.10.30  1            1.1.1.1      gprs.somewhere.com
4444444444444444  60.0.0.4     1            1.1.1.1      xyz.com
5555555555555555  2.0.0.51     0            1.1.1.1      gprs.somewhere.com
)
router# clear gprs gtp charging cdr tid 44444444444444441
```

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

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

**Related Commands**

Command	Description
<a href="#">show gprs access-point</a>	Displays information about an access point.
<a href="#">show gprs charging statistics</a>	Displays current statistics about the transfer of charging packets between the GGSN and charging gateways.

# 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	Parameter	Description
	<b>tid</b> <i>tunnel-id</i>	Tunnel ID (TID) for which PDP contexts are to be cleared.
	<b>imsi</b> <i>imsi_value</i>	International Mobile Subscriber Identity (IMSI) value for which PDP contexts are to be cleared.
	<b>path</b> <i>ip-address</i>	Remote GSN IP address for which all PDP contexts associated with the GSN are to be cleared.
	<b>access-point</b> <i>access-point-index</i>	Access-point index for which PDP contexts are to be cleared.
	<b>all</b>	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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**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 bad user sessions or the system must be taken down for maintenance.

After PDP contexts are cleared, users accessing the PDN through the specified TID, IMSI, path, or access point are disconnected.

To clear PDP contexts by tunnel ID, first enter the **show pdp-context** command to obtain a list of the currently active PDP contexts (mobile sessions). Then issue the **clear gprs gtp pdp-context** command with the **tid** keyword and the tunnel ID for which you want to clear the user sessions.

To clear PDP contexts by access point, first issue the **show gprs access-point** command to obtain a list of the access points, and then issue the **clear gprs gtp pdp-context** command.

If you know the IMSI of the PDP context, enter **clear gprs gtp pdp-context** and the IMSI of the connected user to clear the PDP context.

---

**Examples**

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

```
router# show gprs gtp pdp-context all
```

TID	MS_ADDR	dynamic?	SGSN_addr	APN
1111111111111111	2.0.0.1	0	1.1.1.1	gprs.somewhere.com
3333333333333331	10.10.10.30	1	1.1.1.1	gprs.somewhere.com
4444444444444441	60.0.0.4	1	1.1.1.1	xyz.com
5555555555555551	2.0.0.51	0	1.1.1.1	gprs.somewhere.com
8888888888888881	10.10.10.31	1	1.1.1.1	gprs.somewhere.com

```
router# clear gprs gtp pdp-context tid 5555555555555551
```

The following example shows how to clear PDP contexts for GPRS 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

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
	12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**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; however, it 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
```

# dhcp-gateway-address

To specify the address returned by the DHCP server in DHCP requests for MS users entering a particular PDN access point, use the **dhcp-gateway-address** access-point configuration command. To restore the default setting for the command (to use the virtual template interface address), use the **no** form of the command.

**dhcp-gateway-address** *ip-address*

**no dhcp-gateway-address** *ip-address*

## Syntax Description

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

## Defaults

The default value for this command is **no dhcp-gateway-address**. When you use the default, the system 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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## Usage Guidelines

Use the **dhcp-gateway-address** command to specify the address returned by the DHCP server in DHCP requests for MS users entering a particular PDN access point. The gateway address is 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.

## Examples

The following example specifies an IP address of the DHCP gateway:

```
access-point 2
access-point-name xyz.com
dhcp-server 60.0.0.1
dhcp-gateway-address 60.0.0.1
exit
```

Related Commands	Command	Description
	<a href="#">dhcp-server</a>	Specifies a primary (and backup) DHCP server to allocate IP addresses to MS users entering a particular PDN access point.
	<a href="#">gprs default ip-address-pool</a>	Specifies a dynamic address allocation method using IP address pools for the GGSN.
	<a href="#">ip-address-pool</a>	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 delete the DHCP server from the access-point configuration, use the **no** form of the command.

**dhcp-server** { *ip-address* | *name* } [*ip-address* | *name*]

**no dhcp-server** { *ip-address* | *name* } [*ip-address* | *name*]

## Syntax Description

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

## Defaults

No default behavior or values.

## Command Modes

Access-point configuration

## Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## Usage Guidelines

To configure DHCP on the router, you must first use the **ip address-pool** global configuration command.

If you use the **ip-address-pool** access-point configuration command to specify a DHCP proxy client for mobile station users who access the PDN through the current access point, then you must use the **dhcp-server** command to specify a DHCP server.

You can use the *ip-address* argument to specify the IP address of the DHCP server. Or, if the server has a host name associated with its IP address (through Domain Name Service configuration), you can use the *name* argument to specify the host name.

The optional second set of arguments can be used to specify the name or 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.

---

**Examples**

The following example specifies a DHCP server to be used to allocate IP addresses to mobile station users:

```
access-point 2
  access-point-name xyz.com
  dhcp-server 60.0.0.1 60.0.0.2
  dhcp-gateway-address 60.0.0.1
exit
```

---

**Related Commands**

Command	Description
<a href="#">dhcp-gateway-address</a>	Specifies the address returned by the DHCP server in DHCP requests for MS users entering a particular PDN access point.
<a href="#">ip-address-pool</a>	Specifies a dynamic address allocation method using IP address pools for the current access point.

# 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 delete this encapsulation type, use the **no** form of the 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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## 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 the SGSN.

## 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 delete an existing access-point list, use the **no** form of the command.

**gprs access-point-list** *list\_name*

**no gprs access-point-list** *list\_name*

## Syntax Description

<i>list_name</i>	The name of the access-point list.
------------------	------------------------------------

## 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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## 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 100.10.10.1 255.255.255.0
 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
	<a href="#">access-point</a>	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 restore the default value for this command, use the **no** form of the command.

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

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

## Syntax Description

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

## Defaults

10 bits per second

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## Usage Guidelines

The **canonical qos best-effort bandwidth-factor** command specifies an average bandwidth that is assumed to be consumed by best-effort QoS class mobile sessions. The default value (10 bps) was chosen arbitrarily. If the users accessing the GGSN are observed using a higher average bandwidth, increase the bandwidth value.

## Examples

The following example shows a bandwidth factor of 20:

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

## Related Commands

Command	Description
<a href="#">gprs canonical-qos gsn-resource-factor</a>	Specifies a value that is used by the GGSN to calculate the QoS level provided to mobile users.

# gprs canonical-qos gsn-resource-factor

To specify a value that is used by the GGSN to calculate the QoS level provided to mobile users, use the **gprs canonical-qos gsn-resource-factor** global configuration command. To restore the default value of the command, use the **no** form of the 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 1048576.

## Defaults

1048576

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## Usage Guidelines

The default value for this command was chosen arbitrarily. 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 shows a resource factor of 1572864:

```
gprs canonical-qos gsn-resource-factor 1572864
```

## Related Commands

Command	Description
<a href="#">gprs canonical-qos best-effort bandwidth-factor</a>	Specifies the bandwidth factor to be applied to the canonical best-effort, QoS class.

# gprs canonical-qos map tos

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

<b>premium</b> <i>tos_value</i>	ToS mapping for a premium QoS. The <i>tos_value</i> can be a number from 0 to 5. A higher number indicates a higher service priority.
<b>normal</b> <i>tos_value</i>	ToS mapping for a normal QoS. The <i>tos_value</i> can be a number from 0 to 5. A higher number indicates a higher service priority.
<b>best-effort</b> <i>tos_value</i>	ToS mapping for a best effort QoS. The <i>tos_value</i> can be a number from 0 to 5. A higher number indicates a higher service priority.

## Defaults

No default behavior or values.

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## 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 interface (GTP tunnels).

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 router 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
<a href="#">gprs canonical-qos best-effort bandwidth-factor</a>	Specifies the bandwidth factor to be applied to the canonical best-effort QoS class.
<a href="#">gprs canonical-qos gsn-resource-factor</a>	Specifies a value that is used by the GGSN to calculate the QoS level provided to mobile users.
<a href="#">gprs canonical-qos premium mean-throughput-deviation</a>	Specifies a mean throughput deviation factor that the GGSN uses to calculate the allowable data throughput for QoS.
<a href="#">gprs qos map canonical-qos</a>	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 QoS, use the **gprs canonical-qos premium mean-throughput-deviation** global configuration command. To restore the default value for the command (100), use the **no** form of the command.

**gprs canonical-qos premium mean-throughput-deviation** *deviation\_factor*

**no gprs canonical-qos premium mean-throughput-deviation** *deviation\_factor*

<b>Syntax Description</b>	<i>deviation_factor</i>	Value that specifies the deviation factor. This value can range from 1 to 1000. The default value is 100.
---------------------------	-------------------------	---

<b>Defaults</b>	100
-----------------	-----

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.	

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

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

Where

EB = the effective bandwidth

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

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

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

**Examples** The following example shows a mean throughput of 1000:

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

Related Commands	Command	Description
	<a href="#">gprs canonical-qos best-effort bandwidth-factor</a>	Specifies the bandwidth factor to be applied to the canonical best-effort QoS class.
	<a href="#">gprs canonical-qos gsn-resource-factor</a>	Specifies a value that is used by the GGSN to calculate the QoS level provided to mobile users.
	<a href="#">gprs canonical-qos map tos</a>	Specifies a QoS mapping from the canonical QoS classes to an IP ToS category.
	<a href="#">gprs charging map data tos</a>	Specifies an IP ToS mapping for GPRS charging packets.

# gprs fastswitch

To enable the GPRS fast switching feature on the GGSN, use the **gprs fastswitch** command. To disable fast switching, use the **no** form of the command.

**gprs fastswitch**

**no gprs fastswitch**

**Syntax Description** This command has no arguments or keywords.

**Defaults** GPRS fast switching is disabled.

**Command Modes** Interface configuration

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**Usage Guidelines** Use the **gprs fastswitch** command to enable the GPRS fast switching feature. This feature implements a fast switching packet cache and fast switching functions that enable faster processing of user packets transmitted using the user datagram protocol (UDP), significantly increasing the performance of the GGSN.



**Note**

If you enable fast switching for the GTP protocol or for a virtual template (using the **gprs fastswitch** command), be sure to enable fast switching on each physical interface that a mobile station uses to access the GTP or the virtual template.

To enable fast switching on a physical interface, use the **ip route-cache** command.

Note also that if you enable fast switching on an SGSN, you should enable fast switching on the GGSNs with which the SGSN communicates.

**Examples** The following example shows how to enable fast switching:

```
gprs fastswitch
```

Related Commands	Command	Description
	<b>ip route-cache</b>	Enables fast switching on a physical interface.

# 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 restore the default value (no error indication throttle is used), use the **no** form of the command (GGSN only).

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

**no gprs gtp error-indication throttle**

## Syntax Description

**window-size** *size* Counter that is decremented when an error indication message is sent and reset to the configured value after one second, with a value between 0 and 256.

## Defaults

Error indication throttling is disabled.

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## 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.

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 the command.

## Examples

The following example shows a throttle value of 150:

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

# 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 restore the default value for the command (5) use the **no** form of the command.

```
gprs gtp map signalling tos tos_value
```

```
no gprs gtp map signalling tos tos_value
```

<b>Syntax Description</b>	<i>tos_value</i>	Value between 0 and 7 that specifies the IP ToS mapping. The default value is 5.
---------------------------	------------------	--

<b>Defaults</b>	ToS value 5
-----------------	-------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.	

<b>Usage Guidelines</b>	Use the <b>gprs gtp map signalling tos</b> 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.
-------------------------	--

<b>Examples</b>	The following example specifies a IP ToS mapping value of 3: <pre>gprs gtp map signalling tos 3</pre>
-----------------	--

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">gprs canonical-qos map tos</a>	Specifies a QoS mapping from the canonical QoS classes to an IP ToS category.
	<a href="#">gprs charging container volume-threshold</a>	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.
	<a href="#">gprs charging map data tos</a>	Specifies an IP ToS mapping for GPRS charging data packets.
	<a href="#">gprs charging packet-queue-size</a>	Specifies the maximum number of unacknowledged charging data transfer requests that the GGSN maintains in its queue.
	<a href="#">gprs charging transfer interval</a>	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 restore the default value for the N3 buffer, use the **no** form of the command.

**gprs gtp n3-buffer-size** *bytes*

**no gprs gtp n3-buffer-size**

<b>Syntax Description</b>	<i>bytes</i>	Value between 2048 and 65535 that specifies the size of the N3 buffer, in bytes. The default is 8192 bytes.
<b>Defaults</b>	8192 bytes	
<b>Command Modes</b>	Global configuration	
<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
	12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.
<b>Usage Guidelines</b>	Use the <b>gprs gtp n3-buffer-size</b> 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).	
<b>Examples</b>	The following example specifies a buffer size of 2084 bytes: <pre>gprs gtp n3-buffer-size 2084</pre>	
<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">gprs gtp n3-requests</a>	Specifies the maximum number of times that the GGSN attempts to send a signaling request.

## gprs gtp n3-requests

To specify the maximum number of times that the GGSN attempts to send a signaling request, use the **gprs gtp n3-requests** global configuration command. To restore the default value (5 request attempts), use the **no** form of the command.

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

```
no gprs gtp n3-requests requests
```

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

<b>Defaults</b>	5 requests
-----------------	------------

<b>Command Modes</b>	Global configuration
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<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.	

<b>Usage Guidelines</b>	Use the <b>gprs gtp n3-requests</b> command to specify the number of times that the GGSN attempts to send a signaling request. The recommended value is 5 requests (the default).
-------------------------	---

<b>Examples</b>	The following example shows the GGSN attempting to send a signaling request 3 times: <pre>gprs gtp n3-requests 3</pre>
-----------------	---

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">gprs gtp n3-buffer-size</a>	Specifies the size of the receive buffer that the GGSN uses to receive GTP signaling messages and packets sent through the tunneling protocol.

# gprs gtp path-echo-interval

To specify the number of seconds that the GGSN waits before sending an echo-request message to check for GTP path failure, use the **gprs gtp path-echo-interval** global configuration command. To restore the default value for the path echo interval (60 seconds), use the **no** form of the command.

**gprs gtp path-echo-interval** *interval*

**no gprs gtp path-echo-interval** *interval*

## Syntax Description

<i>interval</i>	Number of seconds that the GGSN waits before sending an echo-request message. Specify a value between 60 and 65535 seconds. The value 0 disables the echo-request feature. The default is 60 seconds.
-----------------	---

## Defaults

60 seconds

## Command Modes

Global configuration mode

## Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## Usage Guidelines

Use the **gprs gtp path-echo-interval** command to specify the interval that the GGSN waits before sending an echo-request message to check for GTP path failure.



### Note

A value of 0 seconds disables the echo-request feature.

## Examples

The following example shows the GGSN waiting 90 seconds before sending an echo-request message:

```
gprs gtp path echo-interval 90
```

## gprs gtp t3-response

To specify the maximum time that the GGSN waits to respond to a signaling request message, use the **gprs gtp t3-response** global configuration command. To restore the default value for the response interval (1 second), use the **no** form of the command.

```
gprs gtp t3-response response_interval
```

```
no gprs gtp t3-response response_interval
```

<b>Syntax Description</b>	<i>response_interval</i> A value between 1 and 65535 that specifies the length of the T3 response interval, in seconds. The default is 1 second.
---------------------------	--

<b>Defaults</b>	1 second
-----------------	----------

<b>Command Modes</b>	Global configuration
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<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.	

<b>Usage Guidelines</b>	Use the <b>gprs gtp t3-response</b> command to specify the maximum time that the GGSN waits to respond to a signaling request message.
-------------------------	--

<b>Examples</b>	The following example shows a T3 interval response interval of 524 seconds:
-----------------	---

```
gprs gtp t3-response 524
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">gprs gtp t3-tunnel</a>	Specifies the length of time that the GGSN waits, after receiving a GTP context request message from the SGSN, before forwarding a protocol data unit (PDU) to the requesting SGSN.

# gprs gtp t3-tunnel

To specify the length of time that the GGSN waits, after receiving a GTP context request message from the SGSN and before forwarding a protocol data unit (PDU) to the requesting SGSN, use the **gprs gtp t3-tunnel** global configuration command. To restore the default value for the command (20 seconds), use the **no** form of the command.

**gprs gtp t3-tunnel** *seconds*

**no gprs gtp t3-tunnel** *seconds*

<b>Syntax Description</b>	<i>seconds</i>	A value between 1 and 65535 that specifies the interval the GGSN waits before forwarding a PDU to a requesting SGSN. The default is 20 seconds.
---------------------------	----------------	---

<b>Defaults</b>	20 seconds
-----------------	------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.	

<b>Usage Guidelines</b>	Use the <b>gprs gtp t3-tunnel</b> command to specify the interval for which a GGSN waits to forward a PDU to a requesting SGSN. The recommended value is 20 seconds.
-------------------------	--

<b>Examples</b>	The following example shows GGSN waiting 60 seconds before forwarding a PDU to a requesting SGSN:
-----------------	---

```
gprs gtp t3-tunnel 60
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">gprs gtp t3-response</a>	Specifies the maximum time that the GGSN waits to respond to a signaling request message.

# 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 restore the default value for the command (72 hours), use the **no** form of the command.

**gprs idle-pdp-context purge-timer** *hours*

**no gprs idle-pdp-context purge-timer** *hours*

<b>Syntax Description</b>	<i>hours</i>	Value between 0 and 255 that specifies the number of hours that the GGSN waits before purging idle sessions. The value 0 disables the purge timer. The default is 72 hours.
---------------------------	--------------	---

<b>Defaults</b>	72 hours
-----------------	----------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.	

<b>Usage Guidelines</b>	To specify the time that the GGSN waits before purging idle mobile sessions, use the <b>gprs idle-pdp-context purge-timer</b> command. To disable this feature, specify a purge-timer value of 0.
-------------------------	---

<b>Examples</b>	The following example specifies that the GGSN wait for 60 hours before purging idle sessions: <pre>gprs idle-pdp-context purge-timer 60</pre>
-----------------	--

# 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 restore the default value for the command (1000 PDP contexts), use the **no** form of the command.

**gprs maximum-pdp-context-allowed** *pdp\_contexts*

**no gprs maximum-pdp-context-allowed** *pdp\_contexts*

<b>Syntax Description</b>	<i>pdp_contexts</i>	Integer between 1 and 4296967295 that specifies the number of active PDP contexts allowed. The default is 1000 PDP contexts.
---------------------------	---------------------	--

<b>Defaults</b>	1000 PDP contexts
-----------------	-------------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.	

**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 and the amount of memory available on the router.

**Examples** In the following example 10000 PDP contexts are allowed on the GGSN:

```
gprs maximum-pdp-context-allowed 10000
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">gprs idle-pdp-context purge-timer</a>	Specifies the time that the GGSN waits before purging idle mobile sessions.

# gprs qos default-response requested

To configure the GGSN to set 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 the GGSN to its QoS default of best-effort, 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.

## 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
<a href="#">gprs qos map canonical-qos</a>	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 this mapping, use the **no** form of the 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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## Usage Guidelines

Use the **gprs qos map canonical-qos** command to map GPRS QoS into the following canonical categories: best effort, normal, and premium.

## Examples

The following example shows canonical QoS mapping enabled:

```
qos map canonical-qos
```

## Related Commands

Command	Description
<a href="#">gprs canonical-qos</a> <a href="#">gsn-resource-factor</a>	Specifies a value that is used by the GGSN to calculate the QoS level provided to mobile users.
<a href="#">gprs canonical-qos map tos</a>	Specifies a QoS mapping from the canonical QoS classes to an IP ToS category.
<a href="#">gprs canonical-qos premium</a> <a href="#">mean-throughput-deviation</a>	Specifies a mean throughput deviation factor that the GGSN uses to calculate the allowable data throughput for QoS.

## 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 the 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.

**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
```

Related Commands	Command	Description
	<a href="#">gprs default radius-server</a>	Specifies a primary (and backup) RADIUS server that the GGSN uses to authenticate mobile users for access to PDNs.
	<a href="#">radius-server</a>	Specifies a primary (and backup) RADIUS server that the GGSN uses at a particular access point to authenticate mobile users for access to a PDN.

# 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 the command.

```
ip-access-group access_list_number {in | out}
```

```
no ip-access-group access_list_number {in | out}
```

## Syntax Description

<i>access_list_number</i>	Number of an access list that has been set up using the <b>access-list</b> command.
<b>in</b>	The specified access list controls access from the PDN to the mobile station.
<b>out</b>	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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## 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 2.0.0.0 0.255.255.255 any
interface virtual-template 1
 ip address 100.10.10.1 255.255.255.0
 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 99.100.0.3
  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 restore the default value (to use the globally defined address-allocation method, which is set using the **gprs default ip-address-pool** command), use the **no** form of the command.

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

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

## Syntax Description

<b>dhcp-proxy-client</b>	The access-point IP address pool is allocated using a DHCP server.
<b>radius-client</b>	The access-point IP address pool is allocated using a RADIUS server.
<b>disable</b>	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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## 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. You can do this at the global configuration level using the **gprs default radius-server** command, or at the access point level using the **radius-server** command.

**Examples**

The following example sets up 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.

```
gprs default ip-address-pool radius-client
interface virtual-template 1
 ip address 100.10.10.1 255.255.255.0
 no ip directed-broadcast
 encapsulation gtp
 gprs access-point-list abc
!
gprs access-point-list abc
 access-point 1
  access-point-name gprs.everywhere.com
  ip address-pool dhcp-proxy-client
  dhcp-server 99.100.0.3
  exit
!
 access-point 2
  access-point-name xyz.com
  access-mode non-transparent
  radius-server 99.100.0.2
  exit
!
 access-point 3
  access-point-name www.acme.com
  access-mode non-transparent
  radius-server 99.100.0.2
  exit
```

**Related Commands**

Command	Description
<a href="#">dhcp-server</a>	Specifies a primary (and backup) DHCP server to allocate IP addresses to MS users entering a particular PDN access point.
<a href="#">gprs default dhcp-server</a>	Specifies a default DHCP server from which the GGSN obtains IP address leases for mobile users.
<a href="#">gprs default ip-address-pool</a>	Specifies a dynamic address allocation method using IP address pools for the GGSN.
<a href="#">gprs default radius-server</a>	Specifies a primary (and backup) RADIUS server that the GGSN uses to authenticate mobile users for access to PDNs.
<a href="#">radius-server</a>	Specifies a primary (and backup) RADIUS server that the GGSN uses at a particular access point to authenticate mobile users for access to a PDN.

# 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*]

<b>Syntax Description</b>	<i>value</i>	(Optional) String (up to 20 characters long) that the GGSN sends in place of the MSISDN number in authentication requests to a RADIUS server. Valid characters for the string are any of those accepted by the MSISDN encoding specifications, including the integers 0–9, and characters a, b, c, *, and #. The default value is that no string is sent.
---------------------------	--------------	---

<b>Defaults</b>	The MSISDN number is suppressed, and no ID string is sent to the RADIUS server in place of the MSISDN number.
-----------------	---

<b>Command Modes</b>	Access point configuration
----------------------	----------------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(2)	This command was introduced.

<b>Usage Guidelines</b>	Certain countries have privacy laws which prohibit service providers from identifying the MSISDN number of mobile stations in authentication requests. Use the <b>msisdn suppression</b> 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.

<b>Examples</b>	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**

<b>Command</b>	<b>Description</b>
<a href="#">access-mode</a>	Specifies whether the GGSN requests user authentication at the access point to a PDN.
<a href="#">radius-server</a>	Specifies a primary (and backup) RADIUS server that the GGSN uses at a particular access point to authenticate mobile users for access to a PDN.

# protocol-type

To specify the protocol type for the current access point, use the **protocol-type** access-point configuration command.

**protocol-type ip**

**no protocol-type ip**

Syntax Description	ip	Specifies that the access point will use the IP protocol
--------------------	----	--

Defaults	IP
----------	----

Command Modes	Access-point configuration
---------------	----------------------------

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

Usage Guidelines	<p>The only protocol type supported is IP. This is enabled by default.</p> <p>Since the X.25 protocol is not being implemented in the GSM standards, this command is no longer relevant.</p>
------------------	--

Examples	<p>The following example shows IP protocol is chosen:</p> <pre>protocol-type ip</pre>
----------	---

# radius-server

To specify a primary (and backup) RADIUS server that the GGSN uses at a particular access point to authenticate mobile users for access to a PDN, use the **radius-server** access-point configuration command. To delete the RADIUS server identification, use the **no** form of the command.

```
radius-server {ip-address | name} [{ip-address | name}]
```

```
no radius-server {ip-address | name} [{ip-address | name}]
```

## Syntax Description

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

## Defaults

No default behavior or values.

## Command Modes

Access-point configuration

## Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## Usage Guidelines

You can specify a RADIUS server that the GGSN uses at a particular access point to authenticate mobile users for access to a PDN in two ways:

- Enter access-point configuration mode and use the **radius-server** command to specify a RADIUS server for the current access point.
- Specify a global value for the RADIUS server using the **gprs default radius-server** command. In this case, you do not need to specify a RADIUS server for the specific access point.

The optional second set of arguments specifies the name, or IP address, of a backup RADIUS server to use if the primary RADIUS server is unavailable. If you do not specify a backup RADIUS server, then there is not a backup available if the primary server fails.

You must specify a RADIUS server either at the global configuration level or at the access-point configuration level if you have specified **radius-client** as the method for maintaining an IP address pool using the **gprs default ip-address-pool** command, or at the access-point level using the **ip-address-pool** command. The RADIUS server is used for authentication of mobile station users; if the GGSN is used as a RADIUS client, it is used to authenticate users.

**Examples**

The following example specifies a RADIUS server for access-point 3:

```
access-point 3
 access-point-name www.acme.com
 ip-address-pool radius-client
 access-mode non-transparent
 radius-server 99.100.0.2 99.100.0.3
 exit
```

**Related Commands**

Command	Description
<a href="#">gprs default ip-address-pool</a>	Specifies a dynamic address allocation method using IP address pools for the GGSN.
<a href="#">gprs default radius-server</a>	Specifies a primary (and backup) RADIUS server that the GGSN uses to authenticate mobile users for access to PDNs.
<a href="#">ip-address-pool</a>	Specifies a dynamic address allocation method for the current access point.

# service gprs

To specify the type of GPRS support node that is enabled on the router, use the **service gprs** command. To disable GPRS support node functionality, use the **no** form of the command.

```
service gprs {sgsn-datacom | ggsn}
```

```
no service gprs {sgsn-datacom | ggsn}
```

Syntax Description	sgsn-datacom	sgsn-datacom
		Specifies that the router will function as a Serving GPRS Support Node (SGSN) datacom unit.
	ggsn	Specifies that the router will function as a Gateway GPRS Support Node (GGSN).

Defaults	SGSN
----------	------

Command Modes	Global configuration
---------------	----------------------

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

Usage Guidelines	Use the <b>service gprs</b> command to specify the type of GPRS support node that will be maintained on the router.
------------------	---

Examples	The following example configures the GPRS support node as a GGSN:
----------	---

```
service gprs ggsn
```

# 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 restore the default value for this command (255 CDRs), use the **no** form of the command.

**gprs charging cdr-aggregation-limit** *CDR\_limit*

**no gprs charging cdr-aggregation-limit** *CDR\_limit*

<b>Syntax Description</b>	<i>CDR_limit</i>	An integer between 1 and 255 that specifies the number of CDRs that can be accumulated in a charging data transfer message. The default is 255 CDRs.
---------------------------	------------------	--

<b>Defaults</b>	255 CDRs
-----------------	----------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.	

**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.

**Examples**

The following example specifies 128 CDRs:

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

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">gprs charging container volume-threshold</a>	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.
	<a href="#">gprs charging packet-queue-size</a>	Specifies the maximum number of unacknowledged charging data transfer requests that the GGSN maintains in its queue.
	<a href="#">gprs charging transfer interval</a>	Specifies the number of seconds that the GGSN waits before it transfers charging data to the charging gateway.

# 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 this feature, use the **no** form of the 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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**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.

**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
	<a href="#">gprs charging cdr-option node-id</a>	Enables the GGSN to specify the node that generated the CDR in the node ID field in G-CDRs.
	<a href="#">gprs charging cdr-option no-partial-cdr-generation</a>	Disables the GGSN from creating partial G-CDRs.
	<a href="#">gprs charging cdr-option packet-count</a>	Enables the GGSN to provide uplink and downlink packet counts in the optional record extension field of G-CDRs.
	<a href="#">gprs charging cdr-option served-msisdn</a>	Enables the GGSN to provide the MSISDN number from the create PDP context request in G-CDRs.

# 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 this feature use the **no** form of the 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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**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.

**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
	<a href="#">gprs charging cdr-option local-record-sequence-number</a>	Enables the GGSN to use the local record sequence number field in G-CDRs.
	<a href="#">gprs charging cdr-option no-partial-cdr-generation</a>	Disables the GGSN from creating partial G-CDRs.
	<a href="#">gprs charging cdr-option packet-count</a>	Enables the GGSN to provide uplink and downlink packet counts in the optional record extension field of G-CDRs.
	<a href="#">gprs charging cdr-option served-msisdn</a>	Enables the GGSN to provide the MSISDN number from the create PDP context request in G-CDRs.

# 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 disable this feature use the **no** form of the 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.

**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 (both mandatory and optional fields) to be included in any subsequent G-CDRs (partial G-CDRs) for the same PDP context request.

The mandatory fields of a CDR 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.

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
	<b>gprs charging cdr-option local-record-sequence-number</b>	Enables the GGSN to use the local record sequence number field in G-CDRs.
	<b>gprs charging cdr-option node-id</b>	Enables the GGSN to specify the node that generated the CDR in the node ID field in G-CDRs.
	<b>gprs charging cdr-option packet-count</b>	Enables the GGSN to provide uplink and downlink packet counts in the optional record extension field of G-CDRs.
	<b>gprs charging cdr-option served-msisdn</b>	Enables the GGSN to provide the MSISDN number from the create PDP context request in G-CDRs.

# 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 this feature use the **no** form of the 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

Release	Modification
12.1(5)T	This command was introduced.

**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.

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
```

Command	Description
<a href="#">gprs charging cdr-option local-record-sequence-number</a>	Enables the GGSN to use the local record sequence number field in G-CDRs.
<a href="#">gprs charging cdr-option node-id</a>	Enables the GGSN to specify the node that generated the CDR in the node ID field in G-CDRs.
<a href="#">gprs charging cdr-option no-partial-cdr-generation</a>	Disables the GGSN from creating partial G-CDRs.
<a href="#">gprs charging cdr-option served-msisdn</a>	Enables the GGSN to provide the MSISDN number from the create PDP context request in G-CDRs.

# 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 this feature use the **no** form of the 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.

**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
	<a href="#">gprs charging cdr-option local-record-sequence-number</a>	Enables the GGSN to use the local record sequence number field in G-CDRs.
	<a href="#">gprs charging cdr-option node-id</a>	Enables the GGSN to specify the node that generated the CDR in the node ID field in G-CDRs.
	<a href="#">gprs charging cdr-option no-partial-cdr-generation</a>	Disables the GGSN from creating partial G-CDRs.
	<a href="#">gprs charging cdr-option packet-count</a>	Enables the GGSN to provide uplink and downlink packet counts in the optional record extension field of G-CDRs.

## 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 restore the default value of 0 minutes and disable the timer, use the **no** form of the command.

**gprs charging cg-path-requests** *minutes*

**no gprs charging cg-path-requests**

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

<b>Defaults</b>	0 minutes
-----------------	-----------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.	

<b>Usage Guidelines</b>	Use the <b>gprs charging cg-path-requests</b> 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.
-------------------------	---

<b>Examples</b>	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
```

# 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 restore the default value for the command (1 megabyte), use the **no** form of the command.

**gprs charging container volume-threshold** *threshold\_value*

**no gprs charging container volume-threshold** *threshold\_value*

<b>Syntax Description</b>	<i>threshold_value</i>	A value between 1 and 4294967295 that specifies the container threshold value, in bytes. The default is 1,048,576 bytes (1 MB).
---------------------------	------------------------	---

<b>Defaults</b>	1,048,576 bytes (1 MB)
-----------------	------------------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
	12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**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
<a href="#">show gprs charging parameters</a>	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 enable charging transactions, use the **no** form of the 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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**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 the 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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**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
	<a href="#">gprs charging container volume-threshold</a>	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.
	<a href="#">gprs charging map data tos</a>	Specifies an IP ToS mapping for GPRS charging packets.
	<a href="#">gprs charging packet-queue-size</a>	Specifies the maximum number of unacknowledged charging data transfer requests that the GGSN maintains in its queue.
	<a href="#">gprs charging path-protocol</a>	Specifies the protocol that the GGSN uses to transmit and receive charging data.
	<a href="#">gprs charging server-switch-timer</a>	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.

Command	Description
<a href="#">gprs charging tariff-time</a>	Specifies a time of day when GPRS charging tariffs change.
<a href="#">gprs charging transfer interval</a>	Specifies the number of seconds that the GGSN waits before it transfers charging data to the charging gateway.

# 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 restore the default value for the command (3) use the **no** form of the command.

**gprs charging map data tos** *tos\_value*

**no gprs charging map data tos** *tos\_value*

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

<b>Defaults</b>	ToS mapping value 3.
-----------------	----------------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
	12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

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

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

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">gprs charging container volume-threshold</a>	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.
	<a href="#">gprs charging flow-control private-echo</a>	Implements an echo request with private extensions for maintaining flow control on packets transmitted to the charging gateway.
	<a href="#">gprs charging packet-queue-size</a>	Specifies the maximum number of unacknowledged charging data transfer requests that the GGSN maintains in its queue.
	<a href="#">gprs charging path-protocol</a>	Specifies the protocol that the GGSN uses to transmit and receive charging data.

Command	Description
<code>gprs charging server-switch-timer</code>	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.
<code>gprs charging tariff-time</code>	Specifies a time of day when GPRS charging tariffs change.
<code>gprs charging transfer interval</code>	Specifies the number of seconds that the GGSN waits before it transfers charging data to the charging gateway.

## 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 restore the default value for this command, use the **no** form of the command.

**gprs charging packet-queue-size** *queue\_size*

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

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

<b>Defaults</b>	128 packets
-----------------	-------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.	

**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**

<b>Command</b>	<b>Description</b>
<a href="#">gprs charging container volume-threshold</a>	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.
<a href="#">gprs charging flow-control private-echo</a>	Implements an echo request with private extensions for maintaining flow control on packets transmitted to the charging gateway.
<a href="#">gprs charging server-switch-timer</a>	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.
<a href="#">gprs charging tariff-time</a>	Specifies a time of day when GPRS charging tariffs change.
<a href="#">gprs charging transfer interval</a>	Specifies the number of seconds that the GGSN waits before it transfers charging data to the charging gateway.

# 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 restore the default value for the command (UDP), use the **no** form of the command.

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

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

## Syntax Description

<b>udp</b>	User Datagram Protocol, which is a connectionless transport protocol.
<b>tcp</b>	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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## 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
<a href="#">gprs charging container volume-threshold</a>	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.
<a href="#">gprs charging flow-control private-echo</a>	Implements an echo request with private extensions for maintaining flow control on packets transmitted to the charging gateway.
<a href="#">gprs charging packet-queue-size</a>	Specifies the maximum number of unacknowledged charging data transfer requests that the GGSN maintains in its queue.
<a href="#">gprs charging server-switch-timer</a>	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.

Command	Description
<a href="#">gprs charging tariff-time</a>	Specifies a time of day when GPRS charging tariffs change.
<a href="#">gprs charging transfer interval</a>	Specifies the number of seconds that the GGSN waits before it transfers charging data to the charging gateway.

# 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 restore the default value for this command (60 seconds), use the **no** form of the command.

**gprs charging server-switch-timer** *seconds*

**no gprs charging server-switch-timer** *seconds*

## Syntax Description

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

## Defaults

60 seconds

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## 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
```

## 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 delete an existing tariff time, use the **no** form of the command. You can set up a maximum of 32 tariff change times.

**gprs charging tariff-time** *time*

**no gprs charging tariff-time** *time*

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

<b>Defaults</b>	No default behavior or values.
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<b>Command Modes</b>	Global configuration
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<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.	

<b>Usage Guidelines</b>	Use the <b>gprs charging tariff-time</b> command to specify up to 32 times when the charging tariff for using GPRS will change. When the tariff time changes, a container is attached to the CDR for the user.
-------------------------	--

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

# 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 restore the default setting for the transfer interval, use the **no** form of the command.

**gprs charging transfer interval** *seconds*

**no gprs charging transfer interval**

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

<b>Defaults</b>	105 seconds
-----------------	-------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
	12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

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

<b>Examples</b>	The following example specifies an interval of 512 seconds:
-----------------	---

```
gprs charging transfer interval 512
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">gprs charging container volume-threshold</a>	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.
	<a href="#">gprs charging flow-control private-echo</a>	Implements an echo request with private extensions for maintaining flow control on packets transmitted to the charging gateway.
	<a href="#">gprs charging packet-queue-size</a>	Specifies the maximum number of unacknowledged charging data transfer requests that the GGSN maintains in its queue.

Command	Description
<a href="#">gprs charging server-switch-timer</a>	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.
<a href="#">gprs charging tariff-time</a>	Specifies a time of day when GPRS charging tariffs change.

# gprs default charging-gateway

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

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

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

## Syntax Description

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

## Defaults

No default charging gateway is assigned.

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## 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 99.100.0.3 99.100.0.2
```

## Related Commands

Command	Description
<a href="#">gprs charging container volume-threshold</a>	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.
<a href="#">gprs charging flow-control private-echo</a>	Implements an echo request with private extensions for maintaining flow control on packets transmitted to the charging gateway.
<a href="#">gprs charging packet-queue-size</a>	Specifies the maximum number of unacknowledged charging data transfer requests that the GGSN maintains in its queue.
<a href="#">gprs charging server-switch-timer</a>	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.

Command	Description
<a href="#">gprs charging tariff-time</a>	Specifies a time of day when GPRS charging tariffs change.
<a href="#">gprs charging transfer interval</a>	Specifies the number of seconds that the GGSN waits before it transfers charging data to the charging gateway.

# 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 delete the default DHCP server, use the **no** form of the command.

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

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

## Syntax Description

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

## Defaults

No default behavior or values.

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## 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.

In addition to specifying a DHCP server for the GGSN, you must perform the following tasks:

- Specify DHCP as the method for assigning proxy IP addresses using the **ip address-pool** global configuration command or the **gprs default ip-address-pool** global configuration command.
- Specify one or more DHCP servers for the entire router using the **ip dhcp-server** global configuration command.

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.

If you specify a default DHCP server at the global configuration level, then for individual access points, you have two options:

- Specify a DHCP server for individual access points using the **dhcp-server** access-point configuration command. In this case, the DHCP server that you specify for the individual access point is used for dynamic address allocation.
- 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.

**Examples**

```

ip address-pool dhcp-proxy-client
ip dhcp-server 60.0.0.1
ip dhcp-server 101.100.0.3
ip dhcp-server 102.100.0.3
ip dhcp excluded address 60.0.0.1
gprs default ip-address-pool dhcp-proxy-client
gprs default dhcp-server 101.100.0.3

interface virtual-template 1
 ip address 15.10.10.1 255.255.255.0
 no ip directed-broadcast
 encapsulation gtp
 gprs access-point-list abc
!

gprs access-point-list abc
 access-point 1
  access-point-name gprs.everywhere.com
  dhcp-server 101.100.0.3
  ip-access-group 101 in
 exit
!
 access-point 2
  access-point-name xyz.com
  dhcp-server 60.0.0.1
  dhcp-gateway-address 60.0.0.1
 exit
!
 access-point 3
  access-point-name www.my_isp.com
  access-mode non-transparent
 exit

```

**Related Commands**

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

# 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 the address allocation method, use the **no** form of the 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

<b>dhcp-proxy-client</b>	GGSN dynamically acquires IP addresses for an MS from a DHCP server.
<b>disable</b>	Disables dynamic address allocation by the GGSN.
<b>radius-client</b>	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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## Usage Guidelines

Use the **gprs default ip-address-pool** command to specify the method by which the GGSN obtains address leases for mobile sessions.

If you specify **dhcp-proxy-client** for the GPRS default IP address pool, then you must use the **gprs default dhcp-server** command, or the access-point mode **dhcp-server** command, to specify a DHCP server for address allocation. You should also configure the router to use DHCP using the **ip dhcp-server dhcp-proxy-client** command.

If you specify **radius-client** as the method for IP address allocation, then you must use the **gprs default radius-server** command or the access-point mode **radius-server** command to specify a RADIUS server to provide the address pool. You also need to configure AAA on the router.

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

## Examples

The following example specifies a dhcp-proxy-client dynamic address allocation method for the GGSN:

```
gprs default ip-address-pool dhcp-proxy-client
```

**Related Commands**

<b>Command</b>	<b>Description</b>
<a href="#">dhcp-server</a>	Specifies a primary (and backup) DHCP server to allocate IP addresses to MS users entering a particular PDN access point.
<a href="#">gprs default dhcp-server</a>	Specifies a default DHCP server from which the GGSN obtains IP address leases for mobile users.
<a href="#">gprs default radius-server</a>	Specifies a primary (and backup) RADIUS server that the GGSN uses to authenticate mobile users for access to PDNs.
<a href="#">radius-server</a>	Specifies a primary (and backup) RADIUS server that the GGSN uses at a particular access point to authenticate mobile users for access to a PDN.

# gprs default radius-server

To specify a primary (and backup) RADIUS server that the GGSN uses to authenticate mobile users for access to PDNs, use the **gprs default radius-server** global configuration command. To delete the RADIUS server identification, use the **no** form of the command.

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

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

## Syntax Description

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

## Defaults

No default RADIUS server is used.

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## Usage Guidelines

Use the **gprs default radius-server** command to specify a RADIUS server that the GGSN uses to authenticate remote users for access to the PDN. If you have specified **radius-client** as the IP address allocation method using the **gprs default ip-address-pool** command, then you must specify a RADIUS server using the **gprs default radius-server** global configuration command or **radius-server** access-point configuration command.

Use the optional second set of arguments to specify the name, or IP address, of a backup RADIUS server to use in the event that the primary RADIUS server is unavailable. If you do not specify a backup RADIUS server, then a backup is not available if the primary server fails.

If you specify a default RADIUS server at the global configuration level, then for individual access points, you have two options:

- Specify a RADIUS server for individual access points using the **radius-server** command. In this case, the specified RADIUS server for the individual access point is used for dynamic address allocation.
- If you do not specify a RADIUS server for a specified access point, then the RADIUS server specified with the **gprs default radius-server** command is used for that access point.

## Examples

The following example sets up three access points. For the first two access points (access-points 1 and 2) the RADIUS server specified at the global configuration level using the **gprs default radius-server** command is used. For access-point 3, a separate RADIUS server is specified using the **radius-server** command.

```
aaa new-model
aaa authentication ppp default radius
aaa authorization network default radius

radius-server host 100.10.10.1 auth-port 1645 acct-port 1646
radius-server host 101.11.11.1 auth-port 1645 acct-port 1646

radius-server key mykey

gprs default ip-address-pool radius-client
gprs default radius-server 100.10.10.1
!
! Virtual Template configuration
interface virtual-template 0
 ip address 100.10.10.1 255.255.255.0
 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
!
 access-point 3
  access-point-name www.gprs_alcatel.fr
  access-mode non-transparent
  radius-server 101.11.11.1
 exit
```

## Related Commands

Command	Description
<a href="#">gprs default ip-address-pool</a>	Specifies a dynamic address allocation method using IP address pools for the GGSN.
<a href="#">radius-server</a>	Specifies a primary (and backup) RADIUS server that the GGSN uses at a particular access point to authenticate mobile users for access to a PDN.

# show gprs access-point

To obtain information about access points on the GGSN, use the **show gprs access-point** privileged EXEC command.

```
show gprs access-point [access-point-index] [address-allocation] [all]
```

## Syntax Description

<i>access-point-index</i>	Index number of an access point. Information about that access point is shown.
<b>address-allocation</b>	Information about dynamically allocated mobile station (MS) addresses and lease terms for the access point is shown.
<b>all</b>	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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## Usage Guidelines

Use the **show gprs access-point** command to obtain information about an individual access point or about all access points.

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**

The following is sample output of the **show gprs access-point** command:

```
router# show gprs access-point 1
  apn_index 1          apn_name = gprs.somewhere.com
  apn_type: ip  apn_mode: transparent
  dynamic_address_pool: not configured
  apn_dhcp_server: 10.100.0.3
  apn_dhcp_gateway_addr: 10.0.0.0
  apn_radius_server: 10.0.0.0
  apn_charging_gw: 10.0.0.0
  apn_backup_charging_gw: 10.0.0.0
  subscribe_required = 0
  deactivate_pdp_context_on violation = 0
  network_activation_allowed = 0
  number of ip_address_allocated = 0

  Total number of PDP in this APN :4
```

Table 3 describes the fields shown in the display.

**Table 3** *show gprs access-point Field Descriptions*

Field	Description
apn_backup_charging_gw	IP address of the secondary (backup) charging gateway. <b>Note</b> This gateway can not be configured on the GGSN.
apn_charging_gw	IP address of the primary charging gateway. <b>Note</b> This gateway can not be configured on the GGSN.
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	Indicates whether security is transparent or non-transparent.
apn_name	Access-point number name.
apn_radius_server	IP address of RADIUS server, if configured.
apn_type	Protocol used for this access-point number.
deactivate_pdp_context_on violation	Current setting for the <b>access-violation</b> command: 0 indicates that the default setting is active (user packets are discarded); 1 indicates that the optional setting is active (mobile sessions are terminated when there is an access violation).
dynamic_address_pool	Current setting for the <b>ip-address-pool</b> command.
network_activation_allowed	Not supported in the current release.
number of ip_address_allocated	Number of IP addresses allocated to MS users.
subscribe_required	Current setting for the <b>subscription-required</b> command: 0 indicates no subscription is required; 1 indicates a subscription is required for access-point number users.
Total number of PDP in this APN	Number of PDP contexts active for this access-point number.

**Related Commands**

Command	Description
<a href="#">access-point-name</a>	Specifies the network (or domain) name for a PDN that users can access from the GGSN at a defined access point.

# 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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**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:      172.23.55.1
* Default Backup Charging Gateway Address: 172.23.56.23
* Current Active Charging Gateway Address: 172.23.55.1
* Current Backup Charging Gateway Address: 172.23.56.23
* Charging Server Switch-Over Timer:      <60> seconds.
* Charging Path Protocol (0:UDP, 1:TCP):   <0>.
* Charging MAP DATA TOS:                 <3>.
* Charging Transfer Interval:              <105> seconds.
* Charging Transfer Threshold:             <1048576> bytes.
* Charging CDR Aggregation Limit:         <255> CDRs per msg.
* Charging Packet Queue Size:             <128> messages.
- NO Tariff Time Changes.
```

Table 4 describes the fields shown in the display.

**Table 4** 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 <b>gprs charging cdr-aggregation-limit</b> 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 <b>gprs charging map data tos</b> 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 <b>gprs charging packet-queue-size</b> 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 <b>gprs charging path-protocol</b> command.
Charging Server Switch-Over Timer	Amount of time (in seconds) that the GGSN waits before sending charging data to the backup charging gateway, after the active charging gateway fails. You can configure this period of time using the <b>gprs charging server-switch-timer</b> command.
Charging Tariff Time Changes	Time of day when GPRS charging tariffs change. You can configure this time using the <b>gprs charging tariff-time</b> 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 <b>gprs charging transfer interval</b> 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 <b>gprs charging container volume-threshold</b> 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 <b>gprs default charging-gateway</b> command.

**Table 4** *show gprs charging parameters Field Descriptions (continued)*

Field	Description
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 <b>gprs default charging-gateway</b> 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 <b>gprs default charging-gateway</b> command.
Default Charging Gateway Address	IP address of the default primary charging gateway.  You can configure the default primary charging gateway using the <b>gprs default charging-gateway</b> command.

**Related Commands**

Command	Description
<a href="#">show gprs charging statistics</a>	Displays current statistics for the transfer of charging packets between the GGSN and charging gateways.

# show gprs charging statistics

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

**show gprs charging statistics** { *tid tunnel\_id* | **access-point** *access-point-index* | **all** }

Syntax Description	Parameter	Description
	<b>tid</b> <i>tunnel_id</i>	Specifies a tunnel ID for which you want to display charging statistics.
	<b>access-point</b> <i>access-point-index</i>	Specifies the index of the access point for which you want to display statistics.
	<b>all</b>	Requests display of all charging statistics.

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**Usage Guidelines** Use the **show gprs charging statistics** command to display statistics for the transfer of charging packets between the GGSN and charging gateways.

**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 APNs for Charging:                <1>
* Total Number of CDRs for Charging:                <1>
* Total Number of CLOSED CDRs for Charging:         <0>
* Total Number of Containers for Charging:          <0>
* Total Number of pending unack. CDR_Output_Msgs:  <0>
* Total Number of CDR_Output_Msgs sent:            <7>

-- Charging Gateway Statistics --
* Charging Gateway Down Count:                      <5>
* Last Charging Gateway Down Time                    =      2000/10/3 18:47:22
    
```

Table 5 describes the fields shown in the display.

**Table 5** *show gprs charging statistics Field Descriptions*

Field	Description
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.
Total Number of APNs for Charging	Number of access points for which charging data has been collected since the last startup of the GGSN.
Total Number of CDRs for Charging	Number of currently open and closed G-CDRs on the GGSN.
Total Number of CDR_Output_Msgs sent	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.
Total Number of CLOSED CDRs for Charging	Number of currently closed G-CDRs that the GGSN has not yet sent to the charging gateway.
Total Number of Containers for Charging	Number of all currently open and closed charging containers for all G-CDRs on the GGSN.
Total 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
<a href="#">show gprs charging parameters</a>	Displays the current GPRS charging parameters.

# 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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**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 max hold time for old sgsn PDUs T3_tunnel= 20
      GTP buffer size for receiving N3_buffer = 8192
      GTP max pdp context                   = 45000
```

[Table 6](#) describes the fields shown in the display.

**Table 6** *show gprs gtp parameters Field Descriptions*

Field	Description
GTP buffer size for receiving N3_buffer	Current size of the N3 buffer, in bytes.
GTP max hold time for old sgsn PDUs T3_tunnel	Current setting specified by the <b>gprs gtp t3-tunnel</b> command. This command specifies the interval, in seconds, that a GGSN waits to forward a PDU to a requesting SGSN.

**Table 6** show gprs gtp parameters Field Descriptions (continued)

Field	Description
GTP max pdp context	Current setting, specified by <b>gprs maximum-pdp-context-allowed</b> command. This command specifies the maximum number of PDP contexts (mobile sessions) that can be activated on the GGSN.
GTP max retry N3_request	The maximum retry setting for N3 requests.
GTP path echo interval	Interval, in seconds, that the GGSN waits before resending echo responses.
GTP signal max wait time T3_response	Interval, in seconds, that the GGSN waits before responding to a T3 request.

**Related Commands**

Command	Description
<b>gprs gtp n3-buffer-size</b>	Specifies the size of the receive buffer that the GGSN uses to receive GTP signaling messages and packets sent through the tunneling protocol.
<b>gprs gtp n3-requests</b>	Specifies the maximum number of times that the GGSN attempts to send a signaling request.
<b>gprs gtp path-echo-interval</b>	Specifies the interval that the GGSN waits before sending an echo-request message to check for GTP path failure.
<b>gprs gtp t3-response</b>	Specifies the maximum time that the GGSN waits to respond to a signaling request message.
<b>gprs gtp t3-tunnel</b>	Specifies the length of time that the GGSN waits, after receiving a GTP context request message from the SGSN, before forwarding a PDU to the requesting SGSN.
<b>gprs maximum-pdp-context-allowed</b>	Specifies the maximum number of PDP contexts (mobile sessions) that can be activated on the GGSN.

# 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		
	<i>ip-address</i>	Displays GTP path information for a specified IP address.
	<b>all</b>	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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**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** command:

```
router# show gprs gtp path all
      Total number of path : 1

path pointer      local address      Remote address
0x616378D0        10.10.10.1         1.1.1.1
```

[Table 7](#) describes the fields shown in the display.

**Table 7** *show gprs gtp path* Field Descriptions

Field	Description
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 tunnel_id | imsi imsi | path ip-address | access-point
access-point-index | pdp-type ip | qos-precedence {low | normal | high} | all}
```

Syntax Description		
<b>tid</b> <i>tunnel_id</i>		Displays PDP contexts by tunnel ID.
<b>imsi</b> <i>imsi</i>		Displays PDP contexts by International Mobile Subscriber Identity (IMSI).
<b>path</b> <i>ip-address</i>		Displays PDP contexts by IP address.
<b>access-point</b> <i>access-point-index</i>		Displays PDP contexts by access point.
<b>pdp-type</b> <i>ip</i>		Displays PDP contexts that are transmitted via IP.
<b>qos-precedence</b>		Displays PDP contexts for a specified GPRS quality of service precedence type. You can specify the following precedence types: <b>low</b> , <b>normal</b> , or <b>high</b> .
<b>all</b>		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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.
	12.2(1)	The MS International PSTN/ISDN Number (MSISDN) field was added to the output display.

**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.

### 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 (high, 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 example, the default bandwidth for a PDP context in the best effort QoS class is 10 kbps. (You can configure this value using the **gprs canonical-qos best-effort bandwidth-factor** command.) The value 10 appears in the effective bandwidth field of the **show gprs gtp pdp-context tid** command for a PDP context in the best effort class.

To determine an estimate of the potential number of best effort PDP contexts that can be supported on the GGSN, you can divide the total bandwidth available on the GGSN by the effective bandwidth value. For example, the default bandwidth available on the GGSN is 1048576 kbps. (The total GSN resource available is reported in the total gsn\_resource field in the output of the **show gprs gtp status** command.) Therefore, you can divide 1048576 kbps by 10 kbps to yield support for approximately 104857 best effort PDP contexts.

## Examples

### Example 1

The following is sample output of the **show gprs gtp pdp-context all** command:

```
GGSN_1# show gprs gtp pdp-context all
TID                MS_ADDR           dynamic?          SGSN_addr         APN
1111111111111111  10.2.0.1          0                 10.10.10.10      gprs.somewhere.com
3333333333333333  10.10.10.30       1                 10.10.10.10      gprs.somewhere.com
4444444444444444  10.60.0.4         1                 10.10.10.10      xyz.com
5555555555555555  10.2.0.51         0                 10.10.10.10      gprs.somewhere.com
8888888888888888  10.10.10.31       1                 10.10.10.10      gprs.somewhere.com
```

[Table 8](#) describes the fields shown in the display.

**Table 8** show gprs gtp pdp-context Field Descriptions

Field	Description
APN	Access-point name for the access point on which the PDP context is active.
dynamic	The method used for address allocation for mobile station sessions; 0 indicates that static IP address mapping is used; 1 indicates dynamic address allocation through DHCP.
MS_ADDR	IP address of the mobile station.
SGSN_addr	IP address of the SGSN that is processing the packets.
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-context tid 12F1111103000000
TID                MS_ADDR           dynamic?          SGSN_addr         APN
12F1111103000000  10.1.1.1          0                 10.1.1.68         gprs.cisco.com

current time :Jan 29 2001 10:30:36
user_name (IMSI): 211F111130000000      MS address: 10.1.1.1
MS International PSTN/ISDN Number (MSISDN): 21436587214365
```

```

sgsn_addr_signal: 10.1.1.68      ggsn_addr_signal: 10.100.100.1
signal_sequence: 32              seq_tpdu_up: 0
seq_tpdu_down: 0
upstream_signal_flow: 1          upstream_data_flow: 2
downstream_signal_flow: 187      downstream_data_flow: 170
RAupdate_flow:0
pdp_create_time: Jan 29 2001 10:27:20
last_access_time: Jan 29 2001 10:27:20
mnrflag: 0                       tos mask map: 00
gprs qos_req: 1B021F             canonical Qos class(reg.): 01
gprs qos_neg: 1B031F            canonical Qos class(neg.): 01
effective bandwidth: 10
rcv_byte_count: 0                rcv_pkt_count: 0
send_byte_count: 0               send_pkt_count: 0
fast_up_pkt: 0                   fast_up_byte : 0
fast_down_pkt: 0                 fast_down_byte : 0
fast_drop : 0
charging_id: 1                   pdp reference count : 2

```

Table 9 describes the fields shown in the display:

**Table 9** 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.
canonical Qos class (req.)	Requested canonical quality of service class by the PDP context.
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.
dynamic	Method used for MS address allocation, with the following values: <ul style="list-style-type: none"> <li>0—static IP address mapping</li> <li>1—dynamic address allocation using DHCP</li> </ul>
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 (high, normal, or best effort) for 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. <p><b>Note</b> The effective bandwidth does not represent actual bandwidth usage.</p>
fast_down_byte	Total number of G-PDU bytes fast switched on the downlink, from the GGSN to the SGSN.
fast_down_pkt	Total number of G-PDU packets fast switched on the downlink, from the GGSN to the SGSN.
fast_drop	Total number of G-PDU packets dropped during fast switching.

**Table 9** show gprs gtp pdp-context tid Field Descriptions (continued)

Field	Description
fast_up_byte	Total number of G-PDU bytes fast switched on the uplink, from the SGSN to the GGSN.
fast_up_pkt	Total number of G-PDU packets fast switched on the uplink, from the SGSN to the GGSN.
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 <i>vwx yzz</i> , which represents the following QoS classes (as defined in the GSM specifications for quality of service profiles): <ul style="list-style-type: none"> <li>• <i>v</i>—Delay class</li> <li>• <i>w</i>—Reliability class</li> <li>• <i>x</i>—Peak throughput class</li> <li>• <i>y</i>—Precedence class</li> <li>• <i>zz</i>—Mean throughput class</li> </ul>
gprs_qos_req	Requested quality of service by the PDP context. The field is in the format <i>vwx yzz</i> , which represents the following QoS classes (as defined in the GSM specifications for quality of service profiles): <ul style="list-style-type: none"> <li>• <i>v</i>—Delay class</li> <li>• <i>w</i>—Reliability class</li> <li>• <i>x</i>—Peak throughput class</li> <li>• <i>y</i>—Precedence class</li> <li>• <i>zz</i>—Mean throughput class</li> </ul>
last_access_time	Time when the PDP context for this TID was last accessed. The date format is MMM DD YYYY. The time format is hours:minutes:seconds.  When a signaling packet or data packet for a PDP context arrives on the GGSN, the last_access_time is reset to the current date and time. If the last_access_time exceeds the purge timer for idle PDP contexts, then the PDP context is purged by the GGSN.
mnrflag	Mobile not reachable flag, with the following values: <ul style="list-style-type: none"> <li>• 0—flag is off</li> <li>• 1—flag is on, indicating that the MS is not reachable</li> </ul>
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.
pdp_create_time	Time when the PDP context for this TID was created. The date format is MMM DD YYYY. The time format is hours:minutes:seconds.

**Table 9** *show gprs gtp pdp-context tid Field Descriptions (continued)*

Field	Description
pdp reference count	Number of subsystems on the GGSN that are aware of the PDP context. For example, if both the charging and GTP subsystems are aware of the PDP context, then the PDP reference counter shows a value of 2.
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.
send_byte_count	Total number of G-PDU bytes sent by the GGSN.
send_pkt_count	Total number of G-PDU packets sent by the GGSN.
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	IP address of the SGSN that is processing the packets.
sgsn_addr_signal	
signal_sequence	Last sequence number used in the GTP signaling message.
TID	Tunnel ID for the PDP context. This value corresponds to the IMSI plus NSAPI.
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.

**Related Commands**

Command	Description
<a href="#">show gprs access-point</a>	Displays information about access points on the GGSN.

# show gprs gtp statistics

To display the current GPRS Tunneling Protocol (GTP) statistics for the GGSN (such as IE, GTP signaling, and GTP PDU statistics), use the **show gprs gtp statistics** privileged EXEC command.

## show gprs gtp statistics

**Syntax Description** This command has no arguments or keywords.

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(2)GB	The following fields were added to the output display: <ul style="list-style-type: none"> <li>total created_pdp</li> <li>total deleted_pdp</li> </ul>
	12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**Usage Guidelines** Use the **show gprs gtp statistics** command to display the GTP statistics for the GGSN. The counter values displayed by this command represent totals accumulated since the last time the statistical counters were cleared using the **clear gprs gtp statistics** command.

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

```
router# show gprs gtp statistics
GPRS GTP Statistics:
  version_not_support      0          msg_too_short           0
  unknown_msg              0          unexpected_sig_msg      0
  unexpected_data_msg      12762     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
  no_resource              0          get_pak_buffer_failure  0
  rcv_signalling_msg       27854     snd_signalling_msg      27854
  rcv_pdu_msg              12762     snd_pdu_msg             0
  rcv_pdu_bytes            1174104  snd_pdu_bytes           0
  total_created_pdp        4          total_deleted_pdp      3
  length_mismatch          0
```

Table 10 describes the fields shown in the display.

**Table 10** *show gprs gtp statistics Field Descriptions*

Field	Description
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).
ie_out_of_order	Number of GTP messages received with an IE out of order.
ie_unexpected	Number of GTP messages received with an IE that is 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 IE of an unknown type.
length_mismatch	Number of GTP messages rejected because the length field of the UDP and GTP headers did not match.
mandatory_ie_incorrect	Number of GTP messages received with an incorrect mandatory IE—for example, with an IE of incorrect length.
mandatory_ie_missing	Number of GTP messages received that are missing a mandatory IE.
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.
optional_ie_incorrect	Number of GTP messages received with an incorrect optional IE. This prevents the GGSN from processing the GTP message correctly.
optional_ie_invalid	Number of GTP messages received with an IE containing a value outside the defined range for that IE. GTP messages with invalid optional IEs are processed as if the IE were 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.
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.
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_dropped	Number of GTP messages dropped.
unexpected_data_msg	Number of GTP PDUs received for nonexistent PDP contexts.
unexpected_sig_msg	Number of unexpected GTP signaling messages received—for example, a message received on the wrong end of the tunnel, or a response message received for a request that was not sent by the GGSN.
unknown_msg	Number of unknown GTP messages received.

**Table 10** *show gprs gtp statistics Field Descriptions (continued)*

Field	Description
version_not_support	Number of GTP messages received from devices running an unsupported version of the GTP.
total created_pdp	Total number of PDP contexts created since system startup (supports Special Mobile Group (SMG)-28 standards level and later).
total deleted_pdp	Total number of PDP contexts deleted since system startup (supports SMG-28 standards level and later).

**Related Commands**

Command	Description
<a href="#">show gprs charging statistics</a>	Displays current statistics for the transfer of charging packets between the GGSN and charging gateways.
<a href="#">show gprs gtp parameters</a>	Displays information about the current GTP configuration on the GGSN.
<a href="#">show gprs gtp path</a>	Displays information about one or more GTP paths between the GGSN and other GPRS devices.
<a href="#">show gprs gtp pdp-context</a>	Displays a list of the currently active PDP contexts (mobile sessions).
<a href="#">show gprs gtp status</a>	Displays information about the current status of GTP on the GGSN.

# 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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**Usage Guidelines** Use the **show gprs gtp status** command to display information about the status of the GTP running on the GGSN.

The values displayed by the **show gprs gtp status** command show totals since the GGSN was started. Unlike the values displayed by the **show gprs gtp statistics** command, these values cannot be cleared.

**Examples** The following example shows output from the **show gprs gtp status** command:

```
router# show gprs gtp status
GPRS GTP Status:
  gsn_used_bandwidth      0.0  total_gsn_resource          1048576.0
  activated_pdp           0    mean_throughput_premium     0.0
  mean_throughput_normal  0.0  mean_throughput_besteffort   0.0

  qos_high_pdp            0    qos_normal_pdp              0
  qos_low_pdp             0    qos_premium_mean-throughput-deviation  0.100
```

[Table 11](#) describes the fields shown in the display.

**Table 11** *show gprs gtp status Field Descriptions*

Field	Description
activated_pdp	Number of PDP contexts currently activated.
gsn_resource	Currently available GSN resources.
gsn_used_bandwidth	Currently used bandwidth, in bits per second.

**Table 11** *show gprs gtp status Field Descriptions (continued)*

<b>Field</b>	<b>Description</b>
mean_throughput_besteffort	Total mean throughput for best effort QoS users, in bytes.
mean_throughput_normal	Total mean throughput for normal QoS users, in bytes.
mean_throughput_premium	Total mean throughput for premium QoS users, in bytes.
qos_high_pdp	Current number of PDP contexts that have a high QoS.
qos_low_pdp	Current number of PDP contexts that have a low QoS.
qos_normal_pdp	Current number of PDP contexts that have a normal QoS.
qos premium mean-throughput-deviation	Current mean throughput deviation for QoS.

**Related Commands**

<b>Command</b>	<b>Description</b>
<a href="#">encapsulation gtp</a>	Specifies GTP as the encapsulation type for packets transmitted over the virtual template interface.
<a href="#">show gprs gtp statistics</a>	Displays the current GTP statistics for the GGSN.

# subscription-required

To specify that a subscription is required to access a PDN through a particular access point, use the **subscription-required** access-point configuration command. To restore the default setting (no subscription is required), use the **no** form of the 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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## Usage Guidelines

Use the **subscription-required** command to specify that a subscription is required for user access to PDNs through the current access point. 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 shows that access-point subscription is required:

```
access-point 1
 access-point-name gprs.somewhere.com
 dhcp-server 125.100.0.3
 subscription-required
 exit
```

# use-interface

To configure the GGSN to use a specific interface for user access at a particular access point, use the **use-interface** access-point configuration command. To deactivate the use of a specific interface, use the **no** form of the command.

**use-interface** *interface\_name* **next-hop-address** *ip\_address*

**no use-interface** *interface\_name* **next-hop-address** *ip\_address*

## Syntax Description

<i>interface_name</i>	Name of an interface on the router to be used by the specified access point.
<i>ip_address</i>	IP address of the gateway device for the virtual private network.

## Defaults

No specific interface is used.

## Command Modes

Access-point configuration

## Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## Usage Guidelines

Use the **use-interface** command to specify a specific router interface to be used with a specified access point. The *interface\_name* argument specifies the name of the interface and the *ip\_address* argument specifies the IP address of the Internet gateway device used for the virtual private network.

## Examples

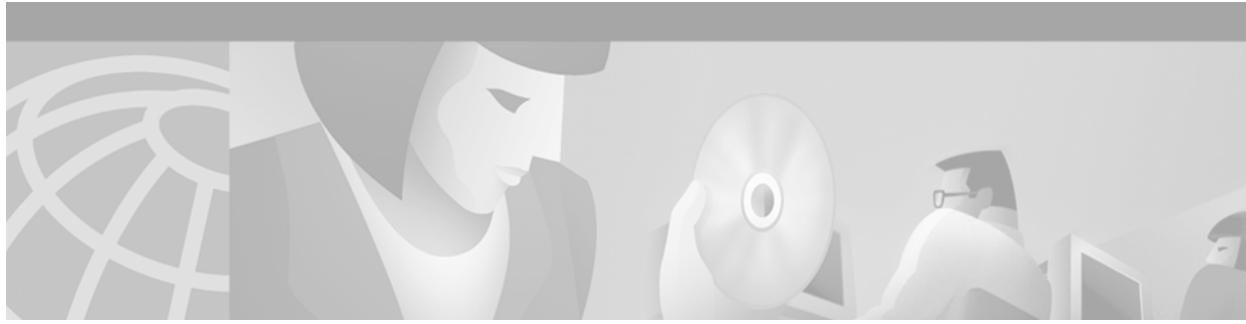
The following example specifies that access-point 1 will use the FastEthernet 4/0 interface on the router:

```
access-point 1
  access-point-name gprs.anywhere.com
  dhcp-server 99.100.0.3
  use-interface FastEthernet4/0 next-hop-address 4.0.0.2
  ip-access-group 101 in
exit
```



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## GPRS 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 GGSN commands that are documented in this book.

Use the commands in this chapter to configure and monitor the GPRS feature in the Cisco IOS software, which allows you to configure a Cisco Systems router to function as a Gateway GPRS Support Node (GGSN). For GPRS configuration tasks and examples, refer to the *Cisco IOS Mobile Wireless Configuration Guide*.

The following GPRS GGSN commands are documented in this book:

- [access-mode](#), page 2
- [access-point](#), page 4
- [access-point-name](#), page 5
- [access-violation](#), page 6
- [clear gprs charging cdr](#), page 7
- [clear gprs gtp pdp-context](#), page 9
- [clear gprs gtp statistics](#), page 11
- [dhcp-gateway-address](#), page 12
- [dhcp-server](#), page 14
- [encapsulation gtp](#), page 16
- [gprs access-point-list](#), page 17
- [gprs canonical-qos best-effort bandwidth-factor](#), page 19
- [gprs canonical-qos gsn-resource-factor](#), page 20
- [gprs canonical-qos map tos](#), page 21
- [gprs canonical-qos premium mean-throughput-deviation](#), page 23
- [gprs charging cdr-aggregation-limit](#), page 47
- [gprs charging cdr-option local-record-sequence-number](#), page 48
- [gprs charging cdr-option node-id](#), page 49
- [gprs charging cdr-option no-partial-cdr-generation](#), page 50
- [gprs charging cdr-option packet-count](#), page 52
- [gprs charging cdr-option served-msisdn](#), page 53
- [gprs charging cg-path-requests](#), page 54

- [gprs charging container volume-threshold, page 55](#)
- [gprs charging disable, page 57](#)
- [gprs charging flow-control private-echo, page 58](#)
- [gprs charging map data tos, page 60](#)
- [gprs charging packet-queue-size, page 62](#)
- [gprs charging path-protocol, page 64](#)
- [gprs charging server-switch-timer, page 66](#)
- [gprs charging tariff-time, page 67](#)
- [gprs charging transfer interval, page 68](#)
- [gprs default charging-gateway, page 70](#)
- [gprs default dhcp-server, page 72](#)
- [gprs default ip-address-pool, page 74](#)
- [gprs default radius-server, page 76](#)
- [gprs fastswitch, page 25](#)
- [gprs gtp error-indication throttle, page 26](#)
- [gprs gtp map signalling tos, page 27](#)
- [gprs gtp n3-buffer-size, page 28](#)
- [gprs gtp n3-requests, page 29](#)
- [gprs gtp path-echo-interval, page 30](#)
- [gprs gtp t3-response, page 31](#)
- [gprs gtp t3-tunnel, page 32](#)
- [gprs idle-pdp-context purge-timer, page 33](#)
- [gprs maximum-pdp-context-allowed, page 34](#)
- [gprs qos default-response requested, page 35](#)
- [gprs qos map canonical-qos, page 36](#)
- [gprs radius msisdn first-byte, page 37](#)
- [ip-access-group, page 38](#)
- [ip-address-pool, page 39](#)
- [msisdn suppression, page 41](#)
- [protocol-type, page 43](#)
- [radius-server, page 44](#)
- [service gprs, page 46](#)
- [show gprs access-point, page 78](#)
- [show gprs charging parameters, page 81](#)
- [show gprs charging statistics, page 84](#)
- [show gprs gtp parameters, page 86](#)
- [show gprs gtp path, page 88](#)

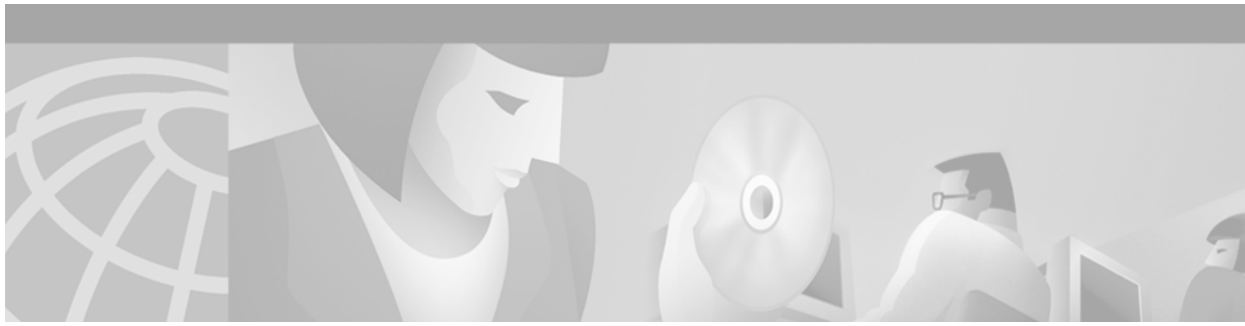
- [show gprs gtp pdp-context](#), page 89
- [show gprs gtp statistics](#), page 94
- [show gprs gtp status](#), page 97
- [subscription-required](#), page 99
- [use-interface](#), page 100





**Appendix**





## SGSN D-Node Commands

---

The commands in this section are for certain operator-specific, SGSN D-node implementations only. These commands are not to be used for any other type of standard, SGSN-related configuration, or to configure any GGSN services.

# clear gprs isgsn statistics

To clear the current GPRS intra-Serving GPRS Support Node (iSGSN) statistics, use the **clear gprs isgsn statistics** privileged EXEC command (SGSN D-node only).

**clear gprs isgsn 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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## Usage Guidelines

Use the **clear gprs isgsn statistics** command to clear the current GPRS iSGSN statistics. This command clears the counters that are displayed by the **show gprs isgsn statistics** command.

## Examples

The following example clears the current GPRS iSGSN statistics:

```
router# clear gprs isgsn statistics
```

# clear l2relay statistics

To clear the Layer 2 Relay (l2relay) statistics for the SGSN, use the **clear l2relay statistics** privileged EXEC command (SGSN D-node only).

## clear l2relay 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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**Usage Guidelines** Use the **clear l2relay statistics** command to clear the current l2relay statistics.

**Examples** The following example clears the l2relay statistics:

```
router# clear l2relay statistics
```

Related Commands	Command	Description
	<a href="#">clear l2relay topology-map</a>	Clears the Layer 2 Relay topology map for the SGSN.

# clear l2relay topology-map

To clear the Layer 2 Relay topology map for the SGSN, use the **clear l2relay topology-map** privileged EXEC command (SGSN D-node only).

## clear l2relay topology-map

**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(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**Usage Guidelines** The SGSN module maintains a l2relay topology map that the router uses to keep a list of the unit IDs (UIDs) of the SGSN-datacom (SGSN-D) and SGSN-telecom (SGSN-T) units with which it can communicate. UIDs are added to the topology map when the router receives self-ID packets from SGSN-D and SGSN-T units on the network.

For debugging purposes, it may be useful to clear the Layer 2 Relay topology map. Using the **clear l2relay topology-map** command clears all of the data structures in the list of SGSN units so that the list can be rebuilt.

Normally you will not need to use this command. If problems with the SGSN are encountered, Cisco technical support personnel may request that you clear the Layer 2 Relay topology map.

**Examples** The following example clears the l2relay topology map for the SGSN:

```
router# clear l2relay topology-map
```

Related Commands	Command	Description
	<a href="#">clear l2relay statistics</a>	Clears the l2relay statistics for the SGSN (SGSN D-node only).

# l2relay echo-interval

To specify the interval at which the SGSN sends l2relay keepalive messages, use the **l2relay echo-interval** global configuration command. To restore the default value for the echo interval (10 seconds) use the **no** form of the command (SGSN D-node only).

**l2relay echo-interval** *seconds*

**no l2relay echo-interval**

<b>Syntax Description</b>	<i>seconds</i>	The length of the echo interval, in seconds. Specify a value between 1 and 360 seconds. The default is 10 seconds.
---------------------------	----------------	--

<b>Defaults</b>	10 seconds
-----------------	------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.	

**Usage Guidelines** Use the **l2relay echo-interval** command to specify the interval at which the SGSN sends Layer 2 Relay keepalive messages.

The SGSN module uses the proprietary l2relay protocol in conjunction with the intra-Serving GPRS Support Node (iSGSN) protocol for communication between the SGSN-datacom (SGSN-D) and SGSN-telecom (SGSN-T) units that comprise the SGSN. Each SGSN-D or SGSN-T unit periodically sends out keepalive messages (echo requests) to the other SGSN units to inform them that it is functioning. You can fine-tune the performance of the nodes that comprise the SGSN by adjusting the echo interval value.

To restore the default value for the echo interval (10 seconds) use the **no** form of the command.

**Examples** The following example shows an interval of 15 seconds between Layer 2 Relay keepalive messages:

```
l2relay echo-interval 15
```

# l2relay flow-control

To specify quench threshold and resume threshold percentages that determine when the l2relay protocol begins and ends flow control processing, use the **l2relay flow-control** global configuration command. To restore the default values for flow control processing, use the **no** form of the command (SGSN D-node only).

**l2relay flow-control** { **enable** | *quench-threshold* | *resume-threshold* }

**no l2relay flow-control**

## Syntax Description

<b>enable</b>	Enables flow control.
<i>quench-threshold</i>	The percentage of congestion that triggers flow control processing.
<i>resume-threshold</i>	The percentage of congestion that triggers resumption of normal processing.

## Defaults

The default value for the *quench-threshold* argument is 80.

The default value for the *resume-threshold* argument is 20.

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

## Usage Guidelines

If you have enabled Layer 2 Relay flow-control processing using the **l2relay flow-control enable** command, you can use the **l2relay flow-control** command to specify congestion percentages that trigger flow control processing or resumption of normal Layer 2 Relay processing.

The *quench-threshold* argument specifies the congestion percentage that must be reached before flow-control processing begins. For example, if you specify 60 for the quench-threshold argument, then the SGSN initiates flow control when Layer 2 Relay processing becomes 60% congested.

The *resume-threshold* argument specifies the congestion percentage that must be reached before normal Layer 2 Relay processing is resumed. For example, if you specify 40 for the resume-threshold argument, then the SGSN resumes normal Layer 2 Relay processing when the congestion percentage decreases to 40%.

## Examples

In the following example, 60 is specified for the quench-threshold argument:

```
l2relay flow-control quench-threshold 60
```

# l2relay pilot-uid

To specify the unit ID of an SGSN-T node to which packets with unknown destination information are transmitted, use the **l2relay pilot-uid** global configuration command. To delete the pilot UID, use the **no** form of the command (SGSN D-node only).

**l2relay pilot-uid** *uid*

**no l2relay pilot-uid**

<b>Syntax Description</b>	<i>uid</i>	Number between 1 and 32 that specifies unit ID for the pilot unit. The default is 0xFF.
---------------------------	------------	---

<b>Defaults</b>	0xFF (invalid UID)
-----------------	--------------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(1)GA	This command was introduced.
12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.	

<b>Usage Guidelines</b>	Each router that is running an SGSN module is assigned a unit ID as part of SGSN configuration. In the event that a packet comes in for an unknown SGSN, the receiving SGSN sends the packet to a unit designated as the “pilot” SGSN-T unit. Use the <b>l2relay pilot-uid</b> command to specify the SGSN-T unit to which packets with unknown destination information are transmitted.
-------------------------	--

<b>Examples</b>	<pre>l2relay uid 5 l2relay pilot-uid 3</pre>
-----------------	--

# l2relay use-interface

To specify the physical interfaces used by the l2relay protocol running on the SGSN, use the **l2relay use-interface** global configuration command (SGSN D-node only).

```
l2relay use-interface interface_1 [interface_2]
```

Syntax Description	<i>interface_1</i>	Interface that is used by the Layer 2 Relay protocol.
	<i>interface_2</i>	A secondary interface that can be used by the Layer 2 Relay protocol.

**Defaults** No default behavior or values.

**Command Modes** Global configuration

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**Usage Guidelines** Use the **l2relay use-interface** command to specify one or more interfaces that the Layer 2 Relay protocol uses to communicate with the SGSN-T and SGSN-D units that comprise the SGSN.

**Examples** The following example shows the configuration for a Fast Ethernet interface (FastEthernet3/0) and the **l2relay use-interface** command that specifies use of that interface.

```
interface FastEthernet3/0
 ip address 5.0.0.55 255.0.0.0
 no ip directed-broadcast
 no ip mroute-cache
 no keepalive
!
l2relay use-interface FastEthernet3/0
```

# show gprs isgsn statistics

To display statistics that show the status of the intra-Serving GPRS Support Node running on the router, use the **show gprs isgsn statistics** privileged EXEC command (SGSN D-node only).

## show gprs isgsn statistics

**Syntax Description** This command has no keywords or arguments.

**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 Local Rejected PDPs field was added to the output display.
	12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**Usage Guidelines** The processing nodes that comprise the SGSN communicate using the proprietary iSGSN Protocol. Each SGSN component running on a Cisco 7200 series router maintains statistical information about the status of the service. Use the **show gprs isgsn statistics** command to display status information about the iSGSN Protocol.

**Examples** The following example shows output from the **show gprs isgsn statistics** command:

```
router# show gprs isgsn statistics

      Input Packets: 16      Bytes:          864
      Output Packets: 16    Bytes:          752
      Input Drops:    4      Out Drops:      0
      Out Errors:    0      Local Rejected PDPs: 0
```

Table 12 describes the fields shown in the display.

**Table 12** *show gprs isgsn statistics Field Descriptions*

Field	Description
Input Packets, Bytes	Number of input packets and total bytes.
Output Packets, Bytes	Number of output packets and total bytes.
Input Drops	Number of dropped input packets.
Out Drops	Number of dropped output packets.

**Table 12** *show gprs isgsn statistics Field Descriptions (continued)*

Field	Description
Out Errors	Number of output errors.
Local Rejected PDPs	Number of GTP create PDP contexts rejected by the D-node (supports SMG-28 standards level and later).

**Related Commands**

Command	Description
<a href="#">show l2relay statistics</a>	Displays statistics that show the status of the Layer 2 Relay Protocol running on the SGSN.

# show l2relay statistics

To display statistics that show the status of the Layer 2 Relay Protocol running on the SGSN, use the **show l2relay statistics** privileged EXEC command (SGSN D-node only).

## show l2relay statistics

**Syntax Description** This command has no keywords or arguments.

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(1)GA	This command was introduced.
	12.1(3)T	This command was integrated in Cisco IOS Release 12.1(3)T.

**Usage Guidelines** Use the **show l2relay statistics** command to display statistical and other information about the Layer 2 Relay protocol running on the SGSN, including the following information:

- Layer 2 Relay Protocol configuration and performance
- The topology of the SGSN components
- Data throughput on the SGSN components

**Examples** The following example shows output from the **show l2relay statistics** command:

```
router# show l2relay statistics

      l2relay uid = 3                unit-type = D
      l2relay echo-time = 10         flow control enable = 1
      l2relay reset_value = 164      l2rly_pak_drop = 0
      l2relay_inputQ len = 0         l2relay_mgmtQ len = 0
      l2relay_flow_quench at 80 %    resume at 20 %
      l2relay pilot_uid = 1

l2relay topology:
-----
      FastEthernet3/0
Type  UID  mac_address1  Tx/Rx  mac_address2  Tx/Rx  Cngst  OQlen
D     3    0050.2a53.0854  1/1    0000.0000.0000  0/0    0      0
T     1    0040.05a2.26cb  1/1    0000.0000.0000  0/0    0      0

l2relay accounting:
-----
Type  UID  Byte_out/Pak_out  Byte_in/Pak_in
D     3    16936/542         0/0
T     1    0/0               0/0
```

Table 13 describes the fields shown in the first part of the display.

**Table 13** show l2relay statistics Field Descriptions

Field	Description
l2relay uid	Unit ID of the SGSN component running on the router.
unit-type	Type of SGSN unit running on the router: D indicates an SGSN-D unit; T indicates an SGSN-T unit.
l2relay echo-time	Configured value for the Layer 2 Relay echo interval.
flow control enable	Indicates whether flow control is enabled on the SGSN unit: 0 indicates flow control is enabled; 1 indicates it is disabled.
l2relay reset_value	Number of times that the SGSN D-unit or T-unit has been reset.
l2rly_pak_drop	Number of packets dropped by the Layer 2 Relay Protocol module.
l2relay_inputQ len	Current length of the Layer 2 Relay input queue.
l2relay_mgmtQ len	Current length of the Layer 2 Relay management queue.
l2relay_flow_quench at	Current Layer 2 Relay quench percentage setting.
resume at	Current Layer 2 Relay resume percentage setting.
l2relay pilot_uid	Currently configured Layer 2 Relay pilot unit ID.

The second part of the output from **show l2relay statistics** shows Layer 2 Relay topology information about each SGSN unit that is running.

Table 14 describes the fields shown in the l2relay topology section of the display.

**Table 14** show l2relay statistics Field Descriptions

Field	Description
Cngst	UID congestion indicator, with the following values: <ul style="list-style-type: none"> <li>0—No congestion.</li> <li>1—Congestion.</li> </ul>
Interface name	Name of the interface specified in the <b>l2relay use-interface</b> command. In the example, the interface is the FastEthernet3/0 interface.
mac_address1	MAC address of the first interface configured with the <b>l2relay use-interface</b> command.
mac_address2	MAC address of the second interface configured with the <b>l2relay use-interface</b> command (if one is configured).
OQlen	Current length of the output queue.
Tx/Rx (first field)	Number of packets transmitted and received over this interface.
Tx/Rx (second field)	Path status indicator for the transmit (Tx) and receive (Rx) path, with the following values: <ul style="list-style-type: none"> <li>0—Problem condition detected on the path.</li> <li>1—Path is functional.</li> </ul>

**Table 14** *show l2relay statistics Field Descriptions (continued)*

Field	Description
Type	Type of SGSN unit, with the following values: <ul style="list-style-type: none"> <li>• D—SGSN datacom (SGSN-D) unit</li> <li>• T—SGSN telecom (SGSN-T) unit</li> </ul>
UID	Unit identifier.

The last part of the output from the **show l2relay statistics** command shows Layer 2 Relay accounting information for each SGSN unit.

[Table 15](#) describes the fields shown in the l2relay accounting section of the display.

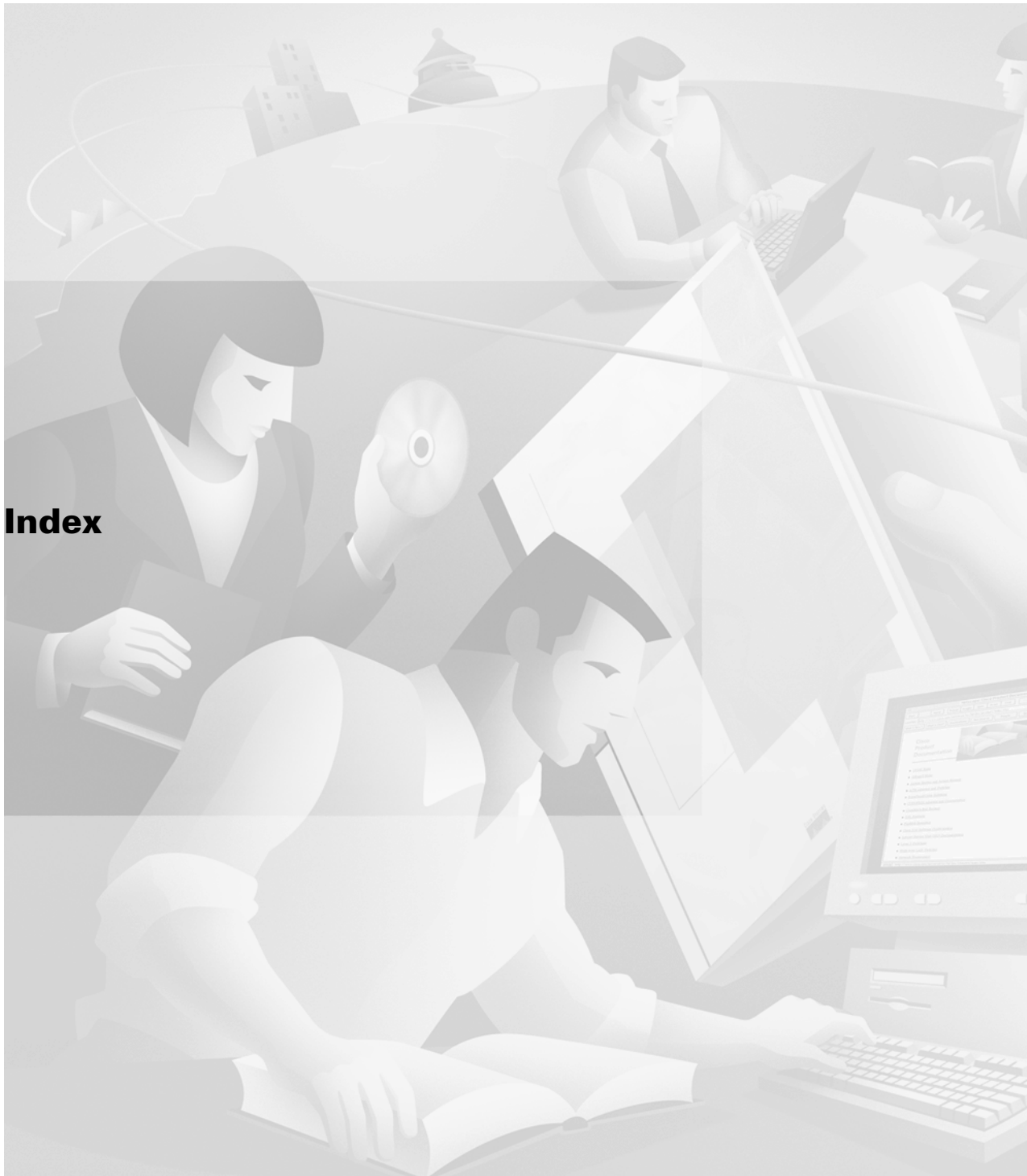
**Table 15** *show l2relay statistics Field Descriptions*

Field	Description
Byte_in/Pak_in	Number of bytes/packets received by this unit.
Byte_out/Pak_out	Number of bytes/packets transmitted by this unit.
Type	Type of SGSN unit, with the following values: <ul style="list-style-type: none"> <li>• D—SGSN datacom (SGSN-D) unit</li> <li>• T—SGSN telecom (SGSN-T) unit</li> </ul>
UID	Unit identifier.

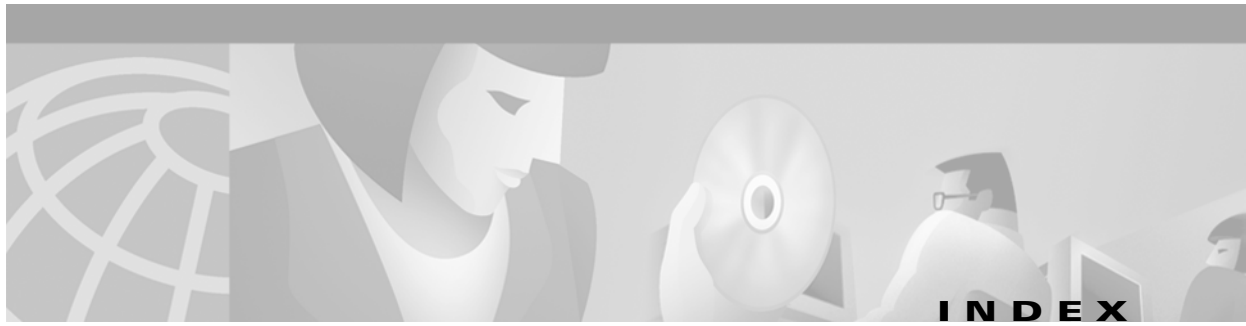
---

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