



# APPENDIX **A**

## Monitoring Notifications

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This appendix describes enabling and monitoring Gateway GPRS Support Node (GGSN) SNMP notifications in order to manage GPRS/UMTS-related issues. SNMP uses notifications to report events on a managed device. The notifications are traps or informs for different events.



### Note

This appendix covers enabling and monitoring GGSN SNMP notifications only. Additional types of SNMP notifications can be enabled on your Cisco router. For more information about the types of SNMP notifications you can enable, see the *Cisco IOS Configuration Fundamentals*, Release 12.4 documentation.

Additionally, to display a list of notifications available on your Cisco router, enter the **snmp-server enable traps ?**

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This appendix contains the following sections:

- [SNMP Overview, page A-1](#)  
[Configuring MIB Support, page A-6](#)  
[Enabling SNMP Support, page A-9](#)  
[Enabling and Disabling SNMP Notifications, page A-9](#)  
[GGSN Notifications, page A-11](#)

## SNMP Overview

The Simple Network Management Protocol (SNMP) is an application-layer protocol that provides a standardized framework and a common language used for monitoring and managing devices in a network.

The SNMP framework has three parts:

**SNMP manager**—A system used to control and monitor the activities of network hosts using SNMP. The most common managing system is called a Network Management System (NMS). The term NMS can be applied to either a dedicated device used for network management, or the applications used on a network-management device. A variety of network management applications are available for use with SNMP. These features range from simple command-line applications to feature-rich graphical user interfaces (such as the CiscoWorks2000 line of products).

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[“Enabling SNMP Support” section on page A-9](#)).

Management Information Base (MIB)—Collection of network-management information, organized hierarchically.

Instead of defining a large set of commands, SNMP places all operations in a get-request, get-next-request, and set-request format. For example, an SNMP manager can get a value from an SNMP agent or set a value in that SNMP agent.

## MIB Description

hierarchically. The MIB consists of collections of managed objects identified by object identifiers. MIBs are accessed using a network-management protocol such as SNMP. A managed object (sometimes called a MIB object or an object) is one of a number of characteristics of a managed device, such as a router. Managed objects comprise one or more object instances, which are essentially variables. The Cisco implementation of SNMP uses the definitions of MIB II variables described in RFC 1213.

MIBs can contain two types of managed objects:

Scalar objects—Define a single object instance (for example, `ifNumber` in the IF-MIB and `bgpVersion` in the BGP4-MIB).

Columnar objects—Defines a MIB table that contains no rows or more than one row, and each row can contain one or more scalar objects, (for example, `ifTable` in the IF-MIB defines the interface).

System MIB variables are accessible through SNMP as follows:

Accessing a MIB variable—Function is initiated by the SNMP agent in response to a request from the NMS. The agent retrieves the value of the requested MIB variable and responds to the NMS with that value.

Setting a MIB variable—Function is initiated by the SNMP agent in response to a message from the NMS. The SNMP agent changes the value of the MIB variable to the value requested by the NMS.

## SNMP Notifications

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- Logs information about the time, type, and severity of the condition
- Generates a notification message, which it then sends to a designated IP host



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**snmp-server host**

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*traps informs*

The Cisco implementation of SNMP uses the definitions of SNMP traps described in RFC 1215.

## SNMP Versions

- **SNMPv1**—The Simple Network Management Protocol: An Internet standard, defined in RFC 1157. Security is based on community strings.

**SNMPv2c**—The community-string based administrative framework for SNMPv2. SNMPv2c is an update of the protocol operations and data types of SNMPv2p (SNMPv2 classic), and uses the community-based security model of SNMPv1.

**SNMPv3**—Version 3 of SNMP. SNMPv3 uses the following security features to provide secure access to devices:

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## SNMPv1 and SNMPv2c

handling support includes expanded error codes that distinguish different kinds of error conditions; these conditions are reported through a single error code in SNMPv1. Error return codes now report the error type. Three kinds of exceptions are also reported:

- no such object exceptions
- no such instance exceptions
- end of MIB view exceptions

## SNMPv3

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## SNMP Security Models and Levels

*Table 0-1 SNMP Security Models and Levels*

Model	Level	Authentication	Encryption	Description
		MD5 or SHA	No	Provides authentication based on HMAC-MD5 or HMAC-SHA algorithm.
v3	authPriv	MD5 or SHA	DES	Provides authentication based on HMAC-MD5 or HMAC-SHA algorithm. Also provides DES 56-bit encryption based on CBC-DES (DES-56) standard.

You must configure the SNMP agent to use the version of SNMP supported by the management station. An agent can communicate with multiple managers; for this reason, you can configure the Cisco IOS software to support communications with one management station using the SNMPv1 protocol, one using the SNMPv2c protocol, and another using SMNPv3.

## Requests for Comments

## Object Identifiers

identifies the MIB object's location in the MIB hierarchy, and provides a means of accessing the MIB object in a network of managed devices:

- Standard RFC MIB OIDs are assigned by the Internet Assigned Numbers Authority (IANA)
- Enterprise MIB OIDs are assigned by Cisco Assigned Numbers Authority (CANA).

Each number in the OID corresponds to a level of MIB hierarchy. For example, the OID 1.3.6.1.4.1.9.9.xyz represents the *xyz*

*nn*

## Related Information and Useful Links

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## TAC Information and FAQs

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- [http://www.cisco.com/warp/public/477/SNMP/mibs\\_9226.shtml](http://www.cisco.com/warp/public/477/SNMP/mibs_9226.shtml) is a list of frequently asked questions (FAQs) about Cisco MIBs.

## SNMP Configuration Information

- - Configuration Fundamentals Configuration Guide*
  - Fundamentals Command Reference*
  - Cisco IOS Configuration*

## Configuring MIB Support

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## Determining MIBs Included for Cisco IOS Releases

Step 1

Step 2

MIB Locator

a.

- 
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7600-SAMI

b.

**Submit**

c6svcsami-g8is-mz.124-15.XQ.bin

c.

**CTRL****Submit**

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## Downloading and Compiling MIBs

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## Considerations for Working with MIBs

### Mismatches on Datatype Definitions

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```
MIB A defines: SomeDatatype ::= INTEGER(0..100)
MIB B defines: SomeDatatype ::= INTEGER(1..50)
```

```
MIB A defines: SomeDatatype ::= DisplayString
MIB B defines: SomeDatatype ::= OCTET STRING (SIZE(0..255))
```

**Technical Tips**

[http://www.cisco.com/pcgi-bin/Support/browse/psp\\_view.pl?p=Internetworking:SNMP&s=Implementation\\_and\\_Configuration#Samples\\_and\\_Tips](http://www.cisco.com/pcgi-bin/Support/browse/psp_view.pl?p=Internetworking:SNMP&s=Implementation_and_Configuration#Samples_and_Tips)

For a list of SNMP object identifiers (OIDs) assigned to MIB objects, go to the following URL and click on **SNMP Object Navigator**



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## Downloading MIBs

Step 1

Step 2

Step 3

Step 4

File > Save    File > Save As

Step 5

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## Compiling MIBs

also compile the MIBs for that platform. For example, if you are running HP OpenView on a UNIX operating system, you must compile platform MIBs with the HP OpenView Network Management System (NMS). For instructions, see the NMS documentation.

# Enabling SNMP Support

- *Cisco IOS Release 12.3 Configuration Fundamentals Configuration Guide*

*Cisco IOS Release 12.3 Configuration Fundamentals Command Reference*

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```
Router (config)# snmp-server community Read_Only_Community_Name
                                     Read_Write_Community_Name rw
```

```
snmp-server view view_name oid-tree {included | excluded}
```

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## Enabling and Disabling SNMP Notifications

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## Enabling and Disabling GGSN Notifications via the CLI

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**Step 1**

**Step 2**

```
snmp-server host host-address          SNMP version community/user(V3)
<UDP port No>
```

Step 3

```
snmp-server enable traps gprs [apn | charging | ggsn | ggsn-apn |  
ggsn-general | ggsn-memory | ggsn-pdp | ggsn-service | gtp | csg | dcca]
```

apn—

charging—

ggsn



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snmp-server enable traps gprs ggsn

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ggsn-apn—

ggsn-general

ggsn-pdp

ggsn-service

gtp

csg

dcca



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gprs

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snmp-server enable traps gtp

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## GGSN Notifications


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## Global Notifications


```

snmp-server enable traps grps
ggsn-apn ggsn-memory ggsn-pdp ggsn-service csg dcca ggsn

```

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**Table A-2** Global Notifications

Notification and Notification Objects	Notes
<b>cGgsnInServiceNotif (1.3.6.1.4.1.9.9.240.2.0.2)</b>	
<b>cGgsnMaintenanceNotif (1.3.6.1.4.1.9.9.240.2.0.3)</b>	
<b>cGgsnMemThresholdReachedNotif (1.3.6.1.4.1.9.9.240.2.0.4)</b>	
<b>cGgsnMemThresholdClearedNotif (1.3.6.1.4.1.9.9.240.2.0.5)</b>	

*Global Notifications (continued)*

<b>cGgsnGlobalErrorNotif (1.3.6.1.4.1.9.9.240.2.0.8)</b>	<b>Note</b>
<b>cGgsnAccessPointNameNotif (1.3.6.1.4.1.9.9.240.2.0.9)</b>	<b>Note</b>
<b>cGgsnPacketDataProtocolNotif (1.3.6.1.4.1.9.9.240.2.0.10)</b>	<b>Note</b>

# Service-Aware Billing Notifications



Note

**Table A-3**      *Service-Aware Billing Notifications*

<b>cGgsnSACsgStateUpNotif (1.3.6.1.4.1.9.9.497.2.0.1)</b>	
<b>cGgsnSACsgStateDownNotif (1.3.6.1.4.1.9.9.497.2.0.2)</b>	
<b>cGgsnSADccaEndUsrServDeniedNotif (1.3.6.1.4.1.9.9.497.2.0.3)</b>	
<b>cGgsnSADccaCreditLimReachedNotif (1.3.6.1.4.1.9.9.497.2.0.4)</b>	
<b>cGgsnSADccaUserUnknownNotif (1.3.6.1.4.1.9.9.497.2.0.5)</b>	

Notification and Notification Objects	Notes
cGgsnSADccaRatingFailedNotif (1.3.6.1.4.1.9.9.497.2.0.6)	
cGgsnSADccaAuthRejectedNotif (1.3.6.1.4.1.9.9.497.2.0.7)	

## Charging Notifications

**Table A-4** Charging Notifications

cgprsCgGatewaySwitchoverNotif (1.3.6.1.4.1.9.9.192.2.0.2)	<p>server-switch-timer</p> <p>switchover priority</p> <p>gprs charging</p>

	<p>Sent when the GGSN charging function is placed in operational mode.</p> <p>The charging function of the GGSN is placed in operational mode using the <code>ggsn charging functional-mode</code> global configuration command or by setting the <code>cgprsCgServiceMode</code> object to <code>operational(1)</code>.</p> <p>Enable the generation of this notification by setting <code>cgprsCGAlarmEnable</code> to <code>true(1)</code>.</p>
	<p>Sent when the GGSN charging function is placed in maintenance mode.</p> <p>The charging function of the GGSN is placed in maintenance mode using the <code>ggsn charging functional-mode</code> global configuration command or by setting the <code>cgprsCgServiceMode</code> object to <code>maintenance(2)</code>.</p> <p>Enable the generation of this notification by setting <code>cgprsCGAlarmEnable</code> to <code>true(1)</code>.</p>

[Table A-5](#) lists access-point-related notifications supported by the CISCO-GPRS-ACC-PT-MIB. To enable these notifications to be sent, use the `cgprsCGAlarmEnable` global configuration command.

**Table A-5**      **Access-point Notifications**

<b>cgprsAccPtSecSrcViolNotif (1.3.6.1.4.1.9.9.183.2.0.2)</b>	<p style="text-align: right;"><b>security verify</b></p> <p style="text-align: center;"><b>ipv6 security verify source</b></p>
	<p style="text-align: right;"><b>security verify</b></p> <p><b>destination</b></p>

Notification and Notification Objects	Notes
cgprsAccPtMaintenanceNotif (1.3.6.1.4.1.9.9.183.2.0.4)	
cgprsAccPtInServiceNotif (1.3.6.1.4.1.9.9.183.2.0.5)	

## GTP Notification

*Table A-6 GTP Notification*

	gprs gtp n3-requests

## Alarm Notifications

**Table A-7 Notification Severity Levels**

Severity Level	Description

with an Alarm. [Table A-8](#) identifies the trap types that can be associated

**Table A-8 Alarm Trap Types**

Trap Type	Description

The following sections describe alarms supported by the following notifications:

- [cGgsnGlobalErrorNotif, page A-19](#)
- [cGgsnAccessPointNameNotif, page A-20](#)
- [CgprsCgAlarmNotif, page A-24](#)
- [cgprsAccPtCfgNotif, page A-26](#)

## cGgsnGlobalErrorNotif

**Table A-9** *cGgsnGlobalErrorNotif Alarms*

Alarm	Description
<b>ggsnServiceUp</b>	<p><b>Cause:</b>  <div style="text-align: right;"><b>service gprs</b></div> <b>Severity Level and Trap Type:</b>  <b>Recommended Action:</b></p>
	<p><b>Cause:</b>  <div style="text-align: center;"><b>no gprs service</b></div> <b>Severity Level and Trap Type:</b>  <b>Recommended Action:</b>  <div style="text-align: right;"><b>service gprs</b></div></p>
<b>noDHCPsServer</b>	

## cGgsnAccessPointNameNotif

Alarm	Description
noRadius	<p>1.</p> <p>2.</p> <p>Note</p>

Alarm	Description
<b>ipAllocationFail</b>	<ol style="list-style-type: none"><li>1.<ol style="list-style-type: none"><li>a.</li><li>b.</li><li>c.</li></ol></li><li>2.</li><li>3.</li></ol> <ol style="list-style-type: none"><li>1.<ol style="list-style-type: none"><li>a.</li><li>b.</li><li>c.</li></ol></li><li>2.</li><li>3.</li></ol>
<b>apnUnreachable</b>	

## cGgsnPacketDataProtocolNotif

### *cGgsnPacketDataProtocolNotif Alarms*

<b>Alarm</b>	<b>Description</b>
<b>crlnitFail</b>	
<b>quotaPushFail</b>	

## CgprsCgAlarmNotif

Alarm	Description
<b>cgprsCgAlarmCgDown</b>	The severity level is critical. The trap type is 3.
<b>cgprsCgAlarmCgUp</b>	The severity level is critical. The trap type is 3.
<b>cgprsCgAlarmTransFailure</b>	The severity level is critical. The trap type is 3.
<b>cgprsCgAlarmTransSuccess</b>	
<b>cgprsCgAlarmCapacityFull</b>	

Alarm	Description
<b>cgprsCgAlarmCapacityFree</b>	
<b>cgprsCgAlarmEchoFailure</b>	
<b>cgprsCgAlarmEchoRestored</b>	
<b>cgprsCgAlarmChargingDisabled</b>	
<b>cgprsCgAlarmChargingEnabled</b>	
<b>cgprsCgGatewaySwitchoverNotif</b>	

Alarm	Description
<b>cgprsCgInServiceModeNotif</b>	
<b>cgprsCgMaintenanceModeNotif</b>	

**cgprsAccPtCfgNotif**

Alarm	Description
<b>cgprsAccPtCfgNotif</b>	