



# Monitoring Resource Availability on Cisco AS5300, AS5400, and AS5800 Universal Access Servers

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This feature module describes enhancements to improve visibility into the line and modem status for the network access server (NAS).

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## Feature Overview

NAS modem health is supported by the following features:

- DS-0 Busyout Traps
- ISDN PRI Requested Channel Not Available Traps
- Modem Health Traps
- Show Controllers Timeslots
- DS-1 Loopback Traps

The purpose of these combined feature enhancements is to monitor and maintain NAS modem health. These features have been developed to monitor the NAS health conditions at the digital signal level zero (DS-0) level, PRI bearer channel level, and modem level.

### DS-0 Busyout Traps

DS-0 busyout traps are generated when there is a request to busyout a DS-0, when there is a request to take a DS-0 out of busyout mode, or when busyout completes and the DS-0 is out-of-service. DS-0 busyout traps are generated at the DS-0 level for both channel associated signaling (CAS) and ISDN configured lines. This feature is enabled and disabled by command-line interface (CLI) and MIBs. DS-0 busyout traps are disabled by default and are supported on Cisco AS5300, Cisco AS5400, and Cisco AS5800 universal access servers.

### Modem Health Traps

Modem health traps are generated when a modem port is bad, disabled, reflashed, or shut down, or when there is a request to busyout the modem. This feature is enabled and disabled by CLI and the CISCO-MODEM-MGMT-MIB. Modem health traps are disabled by default and are supported on the Cisco AS5300, Cisco AS5400, and Cisco AS5800.

### ISDN PRI Requested Channel Not Available Traps

ISDN PRI channel not available traps are generated when a requested DS-0 channel is not available, or when there is no modem available to take the incoming call. This feature is available only for ISDN PRI interfaces. This feature is enabled and disabled by CLI for ISDN traps and the CISCO-ISDN-MIB. ISDN PRI channel not available traps are disabled by default and are supported on the Cisco AS5300, Cisco AS5400, and Cisco AS5800.

### Show Controllers Timeslots

The **show controllers** command is augmented with the keyword **timeslots** to display the channel state in detail. This feature shows whether the DS-0 channels of a particular controller are in idle, in-service, maintenance, or busyout state. This enhancement applies to both CAS and ISDN PRI interfaces and is supported on the Cisco AS5300 and Cisco AS5400 only.

### DS-1 Loopback Traps

DS-1 loopback traps are generated when a DS-1 line goes into loopback mode. This feature is enabled and disabled by CLI and the CISCO-POP-MGMT-MIB. DS-1 loopback traps are disabled by default and are supported on the Cisco AS5300 and Cisco AS5400 only.

## Benefits

- Improved visibility into the line status for the NAS for comprehensive health monitoring and notification capability.
- Improved troubleshooting and diagnostics for large dial networks.

## Restrictions

Customers must provide their own management tools.

## Related Documents

- *Cisco IOS Configuration Guide Master Index*, Release 12.1T
- *Cisco IOS Command Reference Master Index*, Release 12.1T
- *Release Notes for Cisco AS5300 Universal Access Servers for Cisco IOS Release 12.1 T*

- *Release Notes for Cisco AS5400 Universal Access Servers for Cisco IOS Release 12.1 T*
- *Release Notes for Cisco AS5800 Universal Access Servers for Cisco IOS Release 12.1 T*
- Cisco AS5300 documentation index
- Cisco AS5400 documentation index
- Cisco AS5800 documentation index

## Supported Platforms

- Cisco AS5300
- Cisco AS5400
- Cisco AS5800

## Supported Standards, MIBs, and RFCs

### Standards

No new or modified standards are supported by this feature.

### MIBs

- CISCO-POP-MGMT-MIB—Supplies the DS-0 busyout traps and the DS-1 loopback traps.
- CISCO-MODEM-MGMT-MIB—Supplies additional modem health traps when the modem port becomes non functional.
- CISCO-ISDN-MIB—Supplies additional traps for ISDN PRI channel not available.
- RFC1406-MIB—Supplies the dsx1LineStatus and dsx1LineIndex objects.

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB web site on Cisco Connection Online (CCO) at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

### RFCs

No new or modified RFCs are supported by this feature.

## Prerequisites

The SNMP manager must already have been installed on your workstation, and the SNMP agent must be configured on the NAS by entering the following commands:

```
snmp-server community public RO
```

```
snmp-server host 10.1.2.3 public
```

Refer to the *Cisco IOS Configuration Guide Master Index*, Release 12.1T for more information about these commands.

## Enabling Tasks

The following sections contain NAS modem health feature enabling tasks.

- Enabling DS-0 Busyout Traps (Required)
- Enabling ISDN PRI Requested Channel Not Available Traps (Required)
- Enabling Modem Health Traps (Required)
- DS-1 Loopback Traps (Required)

### Enabling DS-0 Busyout Traps

To generate DS-0 busyout traps, enter the following command in global configuration mode.

Command	Purpose
Router(config)# <b>snmp-server enable traps ds0-busyout</b>	Generates a trap when there is a request to busyout a DS-0 or to indicate when busyout finishes.

### Enabling ISDN PRI Requested Channel Not Available Traps

To generate ISDN PRI requested channel not available traps, enter the following command in global configuration mode.

Command	Purpose
Router(config)# <b>snmp-server enable traps isdn chan-not-avail</b>	Generates a trap when the NAS rejects an incoming call on an ISDN PRI interface because the channel is not available.

### Enabling Modem Health Traps

To generate modem health traps, enter the following command in global configuration mode.

Command	Purpose
Router(config)# <b>snmp-server enable traps modem-health</b>	Generates a trap when a modem port is bad, disabled, or prepared for firmware download; when download fails; when placed in loopback mode for maintenance; or when there is a request to busyout the modem.

## Enabling DS-1 Loopback Traps

To generate DS-1 loopback traps, enter the following command in global configuration mode.

Command	Purpose
Router(config)# <b>snmp-server enable traps ds1-loopback</b>	Generates a trap when the DS-1 line goes into loopback mode.

## Verifying Enabled Traps

Use the **show run** command to verify that the traps are enabled. The following output indicates that all the traps are enabled:

```
Router(config)# show run

snmp-server enable traps ds0-busyout
snmp-server enable traps isdn chan-not-avail
snmp-server enable traps modem-health
snmp-server enable traps ds1-loopback
```

## Troubleshooting Tips

To troubleshoot the traps, turn on the debug switch for SNMP packets by entering the following in privileged EXEC mode:

```
Router# debug snmp packets
```

Check the resulting output to see that the SNMP trap information packet is being sent. The output will vary based on the kind of packet sent or received:

```
Router# debug snmp packets

SNMP: Packet received via UDP from 10.5.4.1 on Ethernet0
SNMP: Get-next request, reqid 23584, errstat 0, erridx 0
sysUpTime = NULL TYPE/VALUE
  system.1 = NULL TYPE/VALUE
  system.6 = NULL TYPE/VALUE
SNMP: Response, reqid 23584, errstat 0, erridx 0
sysUpTime.0 = 2217027
  system.1.0 = Cisco Internetwork Operating System Software
  system.6.0 =
SNMP: Packet sent via UDP to 10.5.4.1
```

You can also use trap monitoring and logging tools like **snmptrapd**, with debugging flags turned on, to monitor output.

# Configuration Examples

This section shows sample configuration output with all the traps turned on:

Building configuration...

```

Current configuration:
!
! Last configuration change at 12:27:30 pacific Thu May 25 2000
!
version 12.1
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname router
!
aaa new-model
aaa authentication ppp default group radius
enable password <password>
!
spe 1/0 1/7
  firmware location system:/ucode/mica_port_firmware
spe 2/0 2/7
  firmware location system:/ucode/mica_port_firmware
!
!
resource-pool disable
!
!
!
!
!
clock timezone PDT -8
clock calendar-valid
no modem fast-answer
modem country mica usa
modem link-info poll time 60
modem buffer-size 300
ip subnet-zero
!
isdn switch-type primary-5ess
isdn voice-call-failure 0
!
!
!
controller T1 0
  framing esf
  clock source line primary
  linecode b8zs
  pri-group timeslots 1-24
!
controller T1 1
  framing esf
  linecode b8zs
  ds0-group 0 timeslots 1-24 type e&m-fgb
  cas-custom 0
!
controller T1 2
  shutdown
  clock source line secondary 2
!
controller T1 3

```

```
shutdown
  clock source line secondary 3
!
controller T1 4
  shutdown
  clock source line secondary 4
!
controller T1 5
  shutdown
  clock source line secondary 5
!
controller T1 6
  shutdown
  clock source line secondary 6
!
controller T1 7
  shutdown
  clock source line secondary 7
!
!
!
interface Loopback0
  ip address 10.5.4.1
!
interface Ethernet0
  no ip address
  shutdown
!
interface Serial0
  no ip address
  shutdown
!
interface Serial1
  no ip address
  shutdown
!
interface Serial2
  no ip address
  shutdown
!
interface Serial3
  no ip address
  shutdown
!
interface Serial0:23
  no ip address
  ip mroute-cache
  isdn switch-type primary-5ess
  isdn incoming-voice modem
  no cdp enable
!
interface FastEthernet0
  ip address 10.5.4.1
  duplex full
  speed auto
  no cdp enable
!
interface Group-Async1
  ip unnumbered FastEthernet0
  encapsulation ppp
  ip tcp header-compression passive
  no ip mroute-cache
  async mode interactive
  peer default ip address pool swatatest
```

```

no fair-queue
ppp authentication chap
ppp multilink
group-range 1 192
!
interface Dialer1
ip unnumbered FastEthernet0
encapsulation ppp
ip tcp header-compression passive
dialer-group 1
peer default ip address pool swattest
pulse-time 0
no cdp enable
!
ip local pool swattest 10.5.4.1
ip default-gateway 10.5.4.1
ip classless
!
dialer-list 1 protocol ip permit
snmp-server engineID local 00000009020000D058890CF0
snmp-server community public RO
snmp-server packetsize 2048
snmp-server enable traps ds0-busyout
snmp-server enable traps isdn chan-not-avail
snmp-server enable traps modem-health
snmp-server enable traps ds1-loopback
snmp-server host 10.5.4.1 public
!
radius-server host 10.5.4.1 auth-port 1645 acct-port 1646
radius-server retransmit 3
radius-server key <password>
!
!
line con 0
transport input none
line 1 192
autoselect ppp
modem InOut
transport preferred none
transport input all
transport output none
line aux 0
line vty 0 4

end

```

## Command Reference

This section documents new or modified commands that support NAS modem health. All other commands used with this feature are documented in the Cisco IOS Release 12.1 command reference publications.

- **show controllers**
- **snmp-server enable traps**

# show controllers

To show the channel associated signaling (CAS) and ISDN PRI state in detail, use the **show controllers timeslots** privileged EXEC command.

**show controllers t1/e1** *controller number* **timeslots** *timeslot range*

Syntax Description		
	<i>controller number</i>	Controller number of CAS or ISDN PRI time slot. Range 0 through 7.
	<i>timeslot range</i>	Time slot range 1 through 31 for E1, 1 through 24 for T1.

**Defaults** This command is disabled by default.

**Command Modes** EXEC

Command History	Release	Modification
	10.0	This command was introduced.
	12.1(3)T	The <b>timeslots</b> keyword was added.
	12.1(5)T	Support for Cisco AS5400 universal access servers was added.

**Usage Guidelines** Use the **show controllers t1/e1 timeslots** command to display the CAS and ISDN PRI channel state in detail. This command shows whether the DS-0 channels of a controller are in idle, in-service, maintenance, or busyout states. Enter the **show controllers t1/e1** command to display statistics about the T1 or E1 links.

**Examples**

The following example shows that the CAS state is enabled on the Cisco AS5300 with a T1 PRI card:

```
DA-Slot1# show controllers t1 1 timeslots 1-24
```

```
T1 1 is up:
```

```
Loopback: NONE
```

DS0	Type	Modem	<->	Service State	Channel State	Rx				Tx			
						A	B	C	D	A	B	C	D
1	cas-modem	1	in	insvc	connected	1	1	1	1	1	1	1	1
2	cas	-	-	insvc	idle	0	0	0	0	0	0	0	0
3	cas	-	-	insvc	idle	0	0	0	0	0	0	0	0
4	cas	-	-	insvc	idle	0	0	0	0	0	0	0	0
5	cas	-	-	insvc	idle	0	0	0	0	0	0	0	0
6	cas	-	-	insvc	idle	0	0	0	0	0	0	0	0
7	cas	-	-	insvc	idle	0	0	0	0	0	0	0	0
8	cas	-	-	insvc	idle	0	0	0	0	0	0	0	0
9	cas	-	-	insvc	idle	0	0	0	0	0	0	0	0
10	cas	-	-	maint	static-bo	0	0	0	0	1	1	1	1
11	cas	-	-	maint	static-bo	0	0	0	0	1	1	1	1
12	cas	-	-	maint	static-bo	0	0	0	0	1	1	1	1
13	cas	-	-	maint	static-bo	0	0	0	0	1	1	1	1
14	cas	-	-	maint	static-bo	0	0	0	0	1	1	1	1
15	cas	-	-	maint	static-bo	0	0	0	0	1	1	1	1
16	cas	-	-	maint	static-bo	0	0	0	0	1	1	1	1
17	cas	-	-	maint	static-bo	0	0	0	0	1	1	1	1
18	cas	-	-	maint	static-bo	0	0	0	0	1	1	1	1
19	cas	-	-	maint	dynamic-bo	0	0	0	0	1	1	1	1
20	cas	-	-	maint	dynamic-bo	0	0	0	0	1	1	1	1
21	cas	-	-	maint	dynamic-bo	0	0	0	0	1	1	1	1
22	unused												
23	unused												
24	unused												

The following example shows that the ISDN PRI state is enabled on the Cisco AS5300 with a T1 PRI card:

```
Router# show controller t1 2 time 1-24
```

```
T1 2 is up:
```

```
Loopback: NONE
```

DS0	Type	Modem	<->	Service State	Channel State	Rx				Tx				
						A	B	C	D	A	B	C	D	
1	pri	-	-	insvc	idle									
2	pri	-	-	insvc	idle									
3	pri	-	-	insvc	idle									
4	pri	-	-	insvc	idle									
5	pri	-	-	insvc	idle									
6	pri	-	-	insvc	idle									
7	pri	-	-	insvc	idle									
8	pri	-	-	insvc	idle									
9	pri	-	-	insvc	idle									
10	pri	-	-	insvc	idle									
11	pri	-	-	insvc	idle									
12	pri	-	-	insvc	idle									
13	pri	-	-	insvc	idle									
14	pri	-	-	insvc	idle									
15	pri	-	-	insvc	idle									
16	pri	-	-	insvc	idle									
17	pri	-	-	insvc	idle									
18	pri	-	-	insvc	idle									
19	pri	-	-	insvc	idle									
20	pri	-	-	insvc	idle									
21	pri-modem	2	in	insvc	busy									
22	pri-modem	1	out	insvc	busy									
23	pri-digi	-	in	insvc	busy									
24	pri-sig	-	-	outofsvc	reserved									

## snmp-server enable traps

To enable the router to send SNMP traps and information, use the **snmp-server enable traps** global configuration command. Use the **no** form of this command to disable SNMP notifications.

```
snmp-server enable traps [notification-type] [notification-option]
```

```
no snmp-server enable traps [notification-type] [notification-option]
```

---

**Syntax Description**

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<i>notification-type</i>	<p>(Optional) Type of notification to enable. If no type is specified, all notifications are sent (including the envmon and repeater notifications). The notification type can be one of the following keywords:</p> <ul style="list-style-type: none"> <li>• <b>bgp</b>—Sends Border Gateway Protocol (BGP) state change notifications.</li> <li>• <b>config</b>—Sends configuration notifications.</li> <li>• <b>ds0-busyout</b>—Generates a trap when there is a request to busyout a DS-0, when there is a request to take a DS-0 out of busyout mode, or when busyout finishes and the DS-0 is out-of-service.</li> <li>• <b>ds1-loopback</b>—Generates a trap when the DS-1 line goes into loopback.</li> <li>• <b>entity</b>—Sends Entity MIB modification notifications.</li> <li>• <b>envmon</b>—Sends Cisco enterprise-specific environmental monitor notifications when an environmental threshold is exceeded. When the <b>envmon</b> keyword is used, you can specify a <i>notification-option</i> value.</li> <li>• <b>frame-relay</b>—Sends Frame Relay notifications.</li> <li>• <b>hsrp</b>—Sends Hot Standby Routing Protocol (HSRP) notifications.</li> <li>• <b>isdn</b>—Sends Integrated Services Digital Network (ISDN) notifications. When the <b>isdn</b> keyword is used, you can specify a <i>notification-option</i> value.</li> <li>• <b>isdn chan-not-avail</b>—Generates a trap when a requested DS-0 channel is not available, or when there is no modem available to take the incoming call.</li> <li>• <b>modem-health</b>—Supplies additional modem health traps when the modem port becomes non functional.</li> <li>• <b>repeater</b>—Sends Ethernet hub repeater notifications. When the <b>repeater</b> keyword is selected, you can specify a <i>notification-option</i> value.</li> <li>• <b>rsvp</b>—Sends Resource Reservation Protocol (RSVP) notifications.</li> <li>• <b>rtr</b>—Sends service assurance agent router notifications.</li> <li>• <b>snmp</b>—Sends Simple Network Management Protocol (SNMP) notifications. When the <b>snmp</b> keyword is used, you can specify a <i>notification-option</i> value.</li> <li>• <b>syslog</b>—Sends error message notifications (Cisco syslog MIB). Specify the level of messages to be sent with the <b>logging history level</b> command.</li> </ul>
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<i>notification-option</i>	<p>(Optional) Subset of notification options following type of notification to enable. The notification option can be one of the following keywords:</p> <ul style="list-style-type: none"> <li>• <b>envmon [voltage   shutdown   supply   fan   temperature]</b> When the <b>envmon</b> keyword is used, you can enable a specific environmental notification type, or accept all notification types from the environmental monitor system. If no option is specified, all environmental notifications are enabled. The option can be one or more of the following keywords: <b>voltage</b>, <b>shutdown</b>, <b>supply</b>, <b>fan</b>, and <b>temperature</b>.</li> <li>• <b>isdn [call-information   isdn u-interface]</b> When the <b>isdn</b> keyword is used, you can specify the <b>call-information</b> keyword to enable an SNMP ISDN call information notification for the ISDN MIB subsystem, or you can specify the <b>isdnu-interface</b> keyword to enable an SNMP ISDN U interface notification for the ISDN U interface MIB subsystem.</li> <li>• <b>repeater [health   reset]</b> When the <b>repeater</b> keyword is used, you can specify the repeater option. If no option is specified, all repeater notifications are enabled. The option can be one or more of the following keywords: <ul style="list-style-type: none"> <li>– <b>health</b>—Enables IETF Repeater Hub MIB (RFC 1516) health notification.</li> <li>– <b>reset</b>—Enables IETF Repeater Hub MIB (RFC 1516) reset notification.</li> </ul> </li> <li>• <b>snmp [authentication]</b> When the <b>snmp</b> keyword is used, you can specify the <b>authentication</b> option to enable SNMP Authentication Failure notifications. (The <b>snmp-server enable traps snmp authentication</b> command replaces the <b>snmp-server trap-authentication</b> command.) If no option is specified, all SNMP notifications are enabled.</li> </ul>
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**Defaults**

This command is disabled by default. Most notification types are disabled. However, some notification types cannot be controlled with this command. For example, some notification types are always enabled. Other notification types are enabled by a different command. For example, the linkUpDown notifications are controlled by the **snmp trap link-status** command.

If you enter this command with no *notification-type* keywords, the default is to enable all notification types controlled by this command.

**Command Modes**

Global configuration

**Command History**

Release	Modification
11.1	This command was introduced.
12.0(2)T	The <b>rsvp</b> keyword was added.
12.0(3)T	The <b>hsrp</b> keyword was added.

Release	Modification
12.1(3)T	The <b>ds0-busyout</b> command was added.
12.1(5)T	The following commands were added: <ul style="list-style-type: none"> <li>• <b>isdn chan-not-avail</b></li> <li>• <b>modem-health</b></li> <li>• <b>ds1-loopback</b></li> </ul> <p>Cisco AS5400 platform support was added for the following traps:</p> <ul style="list-style-type: none"> <li>• DS-0 busyout traps</li> <li>• ISDN channel not available traps</li> <li>• Modem health traps</li> <li>• DS-1 loopback traps</li> </ul> <p>Cisco AS5800 platform support was added for the following traps:</p> <ul style="list-style-type: none"> <li>• DS-0 busyout traps</li> <li>• ISDN channel not available traps</li> <li>• Modem health traps</li> </ul>

### Usage Guidelines

This command is useful for disabling notifications that are generating a large amount of uninteresting or useless noise.

SNMP notifications can be sent as traps or inform requests. This command enables both traps and inform requests for the specified notification types.

If you do not enter an **snmp-server enable traps** command, no notifications controlled by this command are sent. In order to configure the router to send these SNMP notifications, you must enter at least one **snmp-server enable traps** command. If you enter the command with no keywords, all notification types are enabled. If you enter the command with a keyword, only the notification type related to that keyword is enabled. In order to enable multiple types of notifications, you must issue a separate **snmp-server enable traps** command for each notification type and notification option.

The **snmp-server enable traps** command is used in conjunction with the **snmp-server host** command. Use the **snmp-server host** command to specify which host or hosts receive SNMP notifications. In order to send notifications, you must configure at least one **snmp-server host** command.

For a host to receive a notification controlled by this command, both the **snmp-server enable traps** command and the **snmp-server host** command for that host must be enabled. If the notification type is not controlled by this command, only the appropriate **snmp-server host** command must be enabled.

The notification types used in this command all have an associated MIB object that allows them to be globally enabled or disabled. Not all of the notification types available in the **snmp-server host** command have notificationEnable MIB objects, so some of these notification types cannot be controlled using the **snmp-server enable** command.

### Examples

The following example enables the router to send all traps to the host specified by the name myhost.cisco.com, using the community string defined as “public”:

```
snmp-server enable traps
snmp-server host myhost.cisco.com public
```

The following example enables the router to send Frame Relay and environmental monitor traps to the host myhost.cisco.com using the community string “public”:

```
snmp-server enable traps frame-relay
snmp-server enable traps envmon temperature
snmp-server host myhost.cisco.com public
```

The following example does not send traps to any host. The BGP traps are enabled for all hosts, but the only traps enabled to be sent to a host are ISDN traps (which are not enabled in this example).

```
snmp-server enable traps bgp
snmp-server host bob public isdn
```

The following example enables the router to send all inform requests to the host labeled myhost.cisco.com using the community string defined as “public”:

```
snmp-server enable traps
snmp-server host myhost.cisco.com informs version 2c public
```

The following example sends HSRP MIB traps to the host myhost.cisco.com using the community string “public.”

```
snmp-server enable hsrp
snmp-server host myhost.cisco.com traps version 2c public hsrp
```

## Glossary

**CLI**—command-line interface. Interface that allows the user to interact with the operating system by entering commands and optional arguments. The UNIX operating system and DOS provide CLIs. Compare with GUI.

**DS-0**—Digital signal level zero. Framing specification used in transmitting digital signals over a single channel at 64 kbps on a T1 facility. Compare with DS-1.

**DS-1**—Digital signal level. Framing specification used in transmitting digital signals at 1.544 Mbps on a T1 facility (in the United States) or at 2.108 Mbps on an E1 facility (in Europe). Compare with DS-0.

**DSX-1**—Cross-connection point for DS-1 signals.

**MIB**—Management Information Base. Database of network management information that is used and maintained by a network management protocol such as SNMP or CMIP. The value of a MIB object can be changed or retrieved using SNMP or Common Management Information Protocol (CMIP) commands, usually through a GUI network management system. MIB objects are organized in a tree structure that includes public (standard) and private (proprietary) branches.

**NAS**—Network access server. A Cisco platform system (or collection of platforms) that interfaces between a packet environment and a circuit environment. A type of access device.

