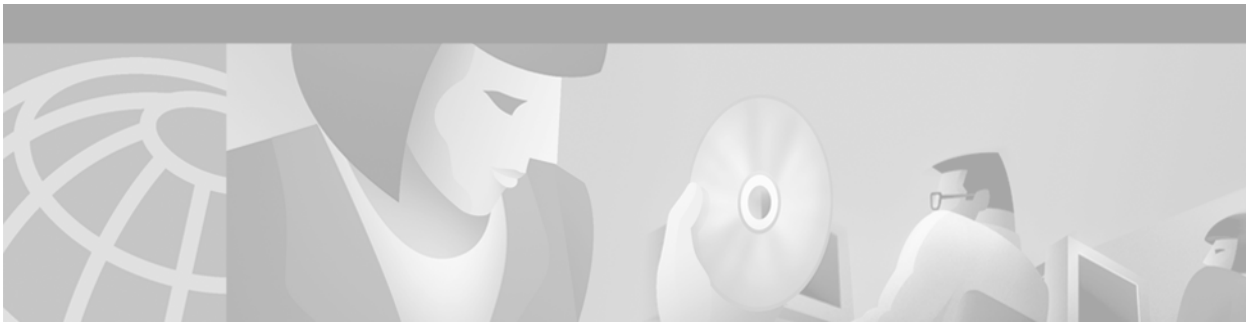

PPPoE Session-Count MIB

Feature History

Release	Modification
12.2(1)DC	This feature was introduced.
12.2(8)T	This feature was integrated into Cisco IOS 12.2(8)T.

This document describes the PPPoE Session Count MIB support introduced in Cisco IOS Release 12.2(8)T. It includes the following sections:

Feature Overview

The PPPoE Session-Count MIB provides the ability to use Simple Network Management Protocol (SNMP) to monitor in real time the number of PPP over Ethernet sessions configured on permanent virtual circuits (PVCs) and on a router.

This new MIB also introduces two SNMP traps that generate notification messages when a PPPoE session-count threshold is reached on any PVC or on the router. The PPPoE session-count thresholds can be configured using the **pppoe limit max-sessions** and **pppoe max-sessions** commands.

Table 1 describes the objects and tables supported by the PPPoE Session-Count MIB. For a complete description of the MIB, see the PPPoE Sessions Management MIB file CISCO-PPPOE-MIB.my, available through Cisco.com at the following URL:

http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml.

Table 1 PPPoE Session Count MIB Objects and Tables

Object	Description
cPppoeSystemCurrSessions	Number of PPPoE sessions active on the router.
cPppoeSystemHighWaterSessions	Total number of PPPoE sessions configured on the router since the system was initialized.
cPppoeSystemMaxAllowedSessions	Number of PPPoE sessions configurable on the router.
cPppoeSystemThresholdSessions	Threshold value of PPPoE sessions configurable on the router.
cPppoeSystemExceededSessionErrors	Accumulated number of errors on the router that have occurred because the cPppoeSystemCurrSessions value exceeded the cPppoeSystemMaxAllowedSessions value.
cPppoeVcCfgTable	PPPoE protocol-related configuration information about the virtual channel links (VCLs).
cPppoeVcSessionsTable	Configuration information and statistics about the number of PPPoE sessions on the VCLs.
cPppoeSystemSessionThresholdTrap	Generates a notification message when the number of PPPoE sessions on the router reaches the configured threshold value.
cPppoeVcSessionThresholdTrap	Generates a notification message when the number of PPPoE sessions on the PVC reaches the configured threshold value.

Benefits

The PPPoE Session Count MIB provides the following benefits:

- It allows the monitoring of PPPoE session counts using SNMP.
- It helps manage the number of PPPoE sessions configured on a router or PVC by sending notification messages when the PPPoE session threshold has been reached.
- It provides a way to track PPPoE session information over time.

Restrictions

The **snmp-server enable traps pppoe** command enables SNMP traps only. It does not support inform requests.

Related Documents

For information on configuring PPPoE for broadband access, see the following documents:

- The chapter “Configuring Broadband Access: PPP and Routed Bridge Encapsulation” if the *Cisco IOS Wide-Area Networking Configuration Guide*, Release 12.2
- The chapter “Broadband Access: PPP and Routed Bridge Encapsulation Commands” in the *Cisco IOS Wide-Area Networking Command Reference*, Release 12.2
- *PPPoE Session Limit*, Cisco IOS Release 12.2(2)T feature module

For information on configuring SNMP using Cisco IOS software, see the following documents:

- The chapter "Configuring SNMP Support" in the *Cisco IOS Configuration Fundamentals Configuration Guide*, Release 12.2
- The chapter "SNMP Commands" in the *Cisco IOS Configuration Fundamentals Command Reference*, Release 12.2

Supported Platforms

- Cisco 820
- Cisco 1400 series
- Cisco 2600 series
- Cisco 3620
- Cisco 3640 router
- Cisco 3660 router
- Cisco 7200
- Cisco 7500 series
- Cisco MC3810
- Cisco uBR7200 series

Platform Support Through Feature Navigator

Cisco IOS software is packaged in feature sets that support specific platforms. To get updated information regarding platform support for this feature, access Feature Navigator. Feature Navigator dynamically updates the list of supported platforms as new platform support is added for the feature.

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

To access Feature Navigator, you must have an account on Cisco.com. If you have forgotten or lost your account information, e-mail the Contact Database Administration group at cdbadmin@cisco.com. If you want to establish an account on Cisco.com, go to http://www.cisco.com/register and follow the directions to establish an account.

Feature Navigator is updated when major Cisco IOS software releases and technology releases occur. As of May 2001, Feature Navigator supports M, T, E, S, and ST releases. You can access Feature Navigator at the following URL:

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

Supported Standards, MIBs, and RFCs

Standards

No new or modified standards are supported by this feature.

MIBs

This feature introduces the PPPoE Session Count MIB. The CISCO-PPPOE-MIB.my can be downloaded from the Cisco MIB website on Cisco.com at:

http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml.

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download other MIB modules, go to the Cisco MIB website on Cisco.com at the following URL:

http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

RFCs

No new or modified RFCs are supported by this feature.

Prerequisites

The tasks as described in this document assume that you have configured SNMP and PPPoE.

Configuration Tasks

See the following sections for configuration tasks for the PPPoE Session Limit MIB feature. Each task in the list is identified as optional or required.

- Enabling PPPoE Session Count SNMP Traps (required)
- Configuring the PPPoE Session-Count Threshold for the Router (optional)
- Configuring the PPPoE Session-Count Threshold for a PVC (optional)
- Configuring the PPPoE Session Count Threshold for a VC Class (optional)
- Configuring the PPPoE Session-Count Threshold for an ATM PVC Range (optional)
- Configuring the PPPoE Session-Count Threshold for an Individual PVC Within a Range (optional)
- Verifying PPPoE Session Count Thresholds (optional)

Enabling PPPoE Session Count SNMP Traps

To enable SNMP traps that send notification messages when PPPoE session thresholds have been reached, use the following command in global configuration mode:

Command	Purpose
`Router(config)# snmp-server enable traps pppoe`	Enables PPPoE session-count Simple Network Management Protocol (SNMP) notifications.

Configuring the PPPoE Session-Count Threshold for the Router

To configure the PPPoE session-count threshold for the router, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# vpdn group name`	Associates a virtual private dialup network (VPDN) group with a customer or VPDN profile.
Step 2	`Router(config-vpdn)# accept dialin`	Creates an accept dial-in VPDN group.
Step 3	`Router(config-vpdn-acc-in)# protocol pppoe`	Configures the Layer 2 Tunneling Protocol (L2TP) that the VPDN subgroup will use.
Step 4	`Router(config-vpdn-acc-in)# virtual-template template-number`	Specifies which virtual template will be used to clone virtual access interfaces.
Step 5	`Router(config-vpdn)# pppoe limit max-sessions number-of-sessions [threshold-sessions number-of-sessions]`	Sets the maximum number of PPPoE sessions that will be permitted on a router, and sets the PPPoE session-count threshold at which an SNMP trap will be generated.

Configuring the PPPoE Session-Count Threshold for a PVC

To configure the PPPoE session-count threshold for a PVC, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# interface atm number [point-to-point | multipoint]`	Configures an ATM interface.[1]
Step 2	`Router(config-if)# pvc [name] vpi/vci`	Configures the PVC.
Step 3	`Router(config-if-atm-vc)# pppoe max-session number-of-sessions [threshold-sessions number-of-sessions]`	Sets the maximum number of PPPoE sessions that will be permitted on an ATM PVC, PVC range, virtual circuit (VC) class, or VLAN, and sets the PPPoE session-count threshold at which an SNMP trap will be generated.

1. To determine the correct form of the **interface atm** command, consult your ATM network module, port adapter, or router documentation.

Configuring the PPPoE Session Count Threshold for a VC Class

To configure the PPPoE session-count threshold for a VC class, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# vc-class atm` *name*	Creates a VC class for an ATM PVC, SVC, or ATM interface.
Step 2	`Router(config-vc-class)# pppoe max-session` *number-of-sessions* `[threshold-sessions` *number-of-sessions*`]`	Sets the maximum number of PPPoE sessions that will be permitted on an ATM PVC, PVC range, VC class, or VLAN, and sets the PPPoE session-count threshold at which an SNMP trap will be generated.

Configuring the PPPoE Session-Count Threshold for an ATM PVC Range

To configure the PPPoE session- count threshold for an ATM PVC range, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# interface atm` *number* `[point-to-point | multipoint]`	Configures an ATM interface.[1]
Step 2	`Router(config-if)# range` [*range-name*] `pvc` *start-vpi*/*start-vci end-vpi*/*end-vci*	Defines a range of ATM PVCs.
Step 3	`Router(cfg-if-atm-range)# pppoe max-session` *number-of-sessions* `[threshold-sessions` *number-of-sessions*`]`	Sets the maximum number of PPPoE sessions that will be permitted on an ATM PVC, PVC range, VC class, or VLAN, and sets the PPPoE session-count threshold at which an SNMP trap will be generated.

1. To determine the correct form of the **interface atm** command, consult your ATM network module, port adapter, or router documentation.

Configuring the PPPoE Session-Count Threshold for an Individual PVC Within a Range

To configure the PPPoE session-count threshold for an individual PVC within an ATM PVC range, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# interface atm` *number* `[point-to-point | multipoint]`	Configures an ATM interface.[1]
Step 2	`Router(config-if)# range` [*range-name*] `pvc` *start-vpi*/*start-vci end-vpi*/*end-vci*	Defines a range of ATM PVCs.

	Command	Purpose
Step 3	`Router(cfg-if-atm-range)# pvc-in-range [pvc-name] [vpi/vci]`	Configures an individual PVC within a PVC range.
Step 4	`Router(cfg-if-atm-range-pvc)# pppoe max-session number-of-sessions [threshold-sessions number-of-sessions]`	Sets the maximum number of PPPoE sessions that will be permitted on an ATM PVC, PVC range, VC class, or VLAN, and sets the PPPoE session-count threshold at which an SNMP trap will be generated.

1. To determine the correct form of the **interface atm** command, consult your ATM network module, port adapter, or router documentation.

Verifying PPPoE Session Count Thresholds

To verify the configuration of PPPoE session-count thresholds, use the following command in EXEC mode:

Command	Purpose
`Router# more system:running-config`	Displays the running configuration.

Monitoring and Maintaining PPPoE Session Counts and SNMP Notifications

To monitor PPPoE session counts and SNMP notifications, use the following commands in EXEC mode:

Command	Purpose
`Router# debug snmp packets`	Displays information about every SNMP packet sent or received by the router.
`Router# debug vpdn pppoe-errors`	Displays PPPoE protocol errors that prevent a session from being established or errors that cause an established session to be closed.
`Router# debug vpdn pppoe-packets`	Displays each PPPoE protocol packet exchanged.
`Router# show vpdn [session][packets][tunnel][all]`	Displays information about active Level 2 Forwarding (L2F) Protocol tunnel and message identifiers in a VPDN.

Configuration Examples

This section provides the following configuration examples:

- Configuring PPPoE Session-Count SNMP Traps Example
- PPPoE Session-Count Threshold for the Router Example
- PPPoE Session-Count Threshold for a PVC Example
- PPPoE Session-Count Threshold for a VC Class Example

- PPPoE Session-Count Threshold for a PVC Range Example
- PPPoE Session-Count Threshold for an Individual PVC Within a PVC Range Example

Configuring PPPoE Session-Count SNMP Traps Example

The following example enables the router to send PPPoE session-count SNMP notifications to the host at the address 10.64.131.20:

```
snmp-server community public RW
snmp-server enable traps pppoe
snmp-server host 10.64.131.20 version 2c public udp-port 1717
```

PPPoE Session-Count Threshold for the Router Example

The following example shows a limit of 4000 PPPoE sessions configured for the router. The PPPoE session-count threshold is set at 3000 sessions, so when the number of PPPoE sessions on the router reaches 3000, an SNMP trap will be generated.

```
vpdn enable
no vpdn logging
!
vpdn-group 1
 accept-dialin
  protocol pppoe
  virtual-template 1
 pppoe limit max-sessions 4000 threshold-sessions 3000
```

PPPoE Session-Count Threshold for a PVC Example

The following example shows a limit of 5 PPPoE sessions configured for the PVC. The PPPoE session-count threshold is set at 3 sessions, so when the number of PPPoE sessions on the PVC reaches 3, an SNMP trap will be generated.

```
interface ATM0/0/0
 ip address 10.0.0.1 255.255.255.0
 no atm ilmi-keepalive
 pvc 5/120
  protocol ip 10.0.0.2 broadcast
  pppoe max-sessions 5 threshold-sessions 3
  protocol pppoe
```

PPPoE Session-Count Threshold for a VC Class Example

The following example shows a limit of 7 PPPoE sessions configured for a VC class called “main”. The PPPoE session-count threshold is set at 3 sessions, so when the number of PPPoE sessions for the VC class reaches 3, an SNMP trap will be generated.

```
vc-class atm main
 pppoe max-sessions 7 threshold-sessions 3
```

PPPoE Session-Count Threshold for a PVC Range Example

The following example shows a limit of 20 PPPoE sessions configured for the PVC range. The PPPoE session-count threshold will also be 20 sessions because when the session-count threshold has not been explicitly configured, it defaults to the PPPoE session limit. An SNMP trap will be generated when the number of PPPoE sessions for the range reaches 20.

```
interface ATM0/0/0.3 point-to-point
 range pvc 3/100 3/105
  pppoe max-sessions 20
  protocol pppoe
```

PPPoE Session-Count Threshold for an Individual PVC Within a PVC Range Example

The following example shows a limit of 10 PPPoE sessions configured for “pvc1”. The PPPoE session-count threshold is set at 3 sessions, so when the number of PPPoE sessions for the PVC reaches 3, an SNMP trap will be generated.

```
interface atm 6/0.110 multipoint
 range range1 pvc 100 4/199
  pvc-in-range pvc1 3/104
   pppoe max-sessions 10 threshold-sessions 3
```

Command Reference

This section documents new or modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.2 command reference publications.

- **pppoe limit max-sessions**
- **pppoe max-sessions**
- **snmp-server enable traps pppoe**

pppoe limit max-sessions

To set the maximum number of PPP over Ethernet (PPPoE) sessions that will be permitted on a router, and to set the PPPoE session-count threshold at which an SNMP trap will be generated, use the **pppoe limit max-sessions** command in VPDN group configuration mode. To remove these settings, use the **no** form of this command.

pppoe limit max-sessions *number-of-sessions* [**threshold-sessions** *threshold-value*]

no pppoe limit max-sessions

Syntax Description

number-of-sessions	Maximum number of PPPoE sessions that will be permitted on the router. The range is from 0 to the maximum number of interfaces on the router.
threshold-sessions	(Optional) Sets the PPPoE session-count threshold at which an SNMP trap will be generated.
threshold-value	Number of PPPoE sessions that will cause an SNMP trap to be generated. The range is from 0 to the maximum number of interfaces on the router.

Defaults

There is no default *number-of-sessions*.

The default *threshold-value* is the configured *number-of-sessions*.

Command Modes

VPDN group configuration

Command History

Release	Modification
12.2(2)T	This command was introduced.
12.2(8)T	This command was modified to configure the PPPoE session-count threshold.

Usage Guidelines

The **snmp-server enable traps pppoe** command must be configured in order for SNMP traps to be generated when the PPPoE session-count threshold is reached.

The following statements describe the different types of PPPoE session limits:

- The **pppoe limit max-sessions** command limits the total number of PPPoE sessions on the router, regardless of the type of medium the sessions are using.
- The **pppoe limit per-mac** command limits the number of PPPoE sessions that can be sourced from a single MAC address. This limit also applies to all PPPoE sessions on the router.
- The **pppoe limit per-vc** and **pppoe limit per-vlan** commands limit the number of PPPoE sessions on all PVCs or VLANs on the router. The **pppoe max-sessions** command limits the number of PPPoE sessions on a specific PVC or VLAN. Limits created for a specific PVC or VLAN using the **pppoe max-session** command take precedence over the global limits created with the **pppoe limit per-vc** and **pppoe limit per-vlan** commands.

Examples

The following example shows a limit of 100 PPPoE sessions configured for the router. An SNMP trap will be generated when the number of PPPoE sessions on the router reaches 90.

```
vpdn enable
!
vpdn-group 1
 accept dialin
  protocol pppoe
  virtual-template 1
 pppoe limit max-sessions 100 threshold-sessions 90
```

Related Commands

Command	Description
debug vpdn pppoe-errors	Displays PPPoE protocol errors that prevent a session from being established or errors that cause an established session to be closed.
pppoe limit per-mac	Specifies the maximum number of PPPoE sessions to be sourced from a MAC address.
pppoe limit per-vc	Specifies the maximum number of PPPoE sessions permitted on all VCs.
pppoe limit per-vlan	Specifies the maximum number of PPPoE sessions permitted on a VLAN.
pppoe max-sessions	Sets the maximum number of PPPoE sessions that will be permitted on an ATM PVC, PVC range, VC class, or VLAN, and sets the PPPoE session-count threshold at which an SNMP trap will be generated.
snmp-server enable traps pppoe	Enables PPPoE session-count SNMP notifications.

pppoe max-sessions

To set the maximum number of PPP over Ethernet (PPPoE) sessions that will be permitted on an ATM permanent virtual circuit (PVC), PVC range, virtual circuit (VC) class, or VLAN, and to set the PPPoE session-count threshold at which an SNMP trap will be generated, use the **pppoe max-sessions** command in the appropriate command mode. To remove this specification, use the **no** form of this command.

pppoe max-sessions *number-of-sessions* [**threshold-sessions** *threshold-value*]

no pppoe max-sessions

Syntax Description

number-of-sessions	Maximum number of PPPoE sessions that will be permitted.
threshold-sessions	(Optional) Sets the PPPoE session-count threshold at which an SNMP trap will be generated. This option is not available in Ethernet subinterface configuration mode.
threshold-value	Number of PPPoE sessions that will cause an SNMP trap to be generated. This option is not available in Ethernet subinterface configuration mode.

Defaults

The default *number-of-sessions* is 100.

The default *threshold-value* is the *number-of-sessions*.

Command Modes

Ethernet subinterface
Interface-ATM-VC configuration
VC-class configuration
ATM PVC range configuration
PVC-in-range configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.
12.2(2)T	This command was modified to limit PPPoE sessions on ATM PVCs, PVC ranges, and VC classes.
12.2(8)T	This command was modified to configure the PPPoE session-count threshold.

Usage Guidelines

Note PPPoE session-count thresholds can be configured for PVCs, PVC ranges, and VC classes. PPPoE session-count thresholds cannot be configured for VLANs.

The **snmp-server enable traps pppoe** command must be configured in order for SNMP traps to be generated when the PPPoE session-count threshold is reached.

The following statements describe the different types of PPPoE session limits:

- The **pppoe limit max-sessions** command limits the total number of PPPoE sessions on the router, regardless of the type of medium the sessions are using.
- The **pppoe limit per-mac** command limits the number of PPPoE sessions that can be sourced from a single MAC address. This limit also applies to all PPPoE sessions on the router.
- The **pppoe limit per-vc** and **pppoe limit per-vlan** commands limit the number of PPPoE sessions on all PVCs or VLANs on the router. The **pppoe max-sessions** command limits the number of PPPoE sessions on a specific PVC or VLAN. Limits created for a specific PVC or VLAN using the **pppoe max-session** command take precedence over the global limits created with the **pppoe limit per-vc** and **pppoe limit per-vlan** commands.

PPPoE session limits created on an ATM PVC take precedence over limits created in a VC class or ATM PVC range.

PPPoE session limits created in an ATM PVC range take precedence over limits created in a VC class.

Examples

VLAN Example

The following example shows a maximum of 200 PPPoE sessions configured for an 802.1Q VLAN subinterface:

```
interface FastEthernet0/0.10
 encapsulation dot1Q 10
 pppoe enable
 pppoe max-session 200
```

ATM PVC Example

The following example shows a limit of 10 PPPoE sessions configured for the PVC. An SNMP trap will be generated when the number of PPPoE sessions on the router reaches 8.

```
interface ATM1/0.102 multipoint
 pvc 3/304
  encapsulation aal5snap
  protocol pppoe
  pppoe max-sessions 10 threshold-sessions 8
```

VC Class Example

The following example shows a limit of 20 PPPoE sessions and a session count threshold of 15 sessions configured for the VC class called “main”:

```
vc-class atm main
 pppoe max-sessions 20 threshold-sessions 15
```

ATM PVC Range Example

The following example shows a limit of 30 PPPoE sessions configured for the ATM PVC range called “range-1”. The session count threshold is also 30 sessions because the *threshold-value* defaults to the *number-of-sessions* value when it has not been explicitly configured.

```
interface atm 6/0.110 multipoint
 range range-1 pvc 100 4/199
  encapsulation aal5snap
  protocol ppp virtual-template 2
  pppoe max-sessions 30
```

Individual PVC Within a PVC Range Example

The following example shows a limit of 10 PPPoE sessions configured for “pvc1”, which is part of the ATM PVC range called “range1”. The PPPoE session count threshold is also 10 sessions.

```
interface atm 6/0.110 multipoint
 range range1 pvc 100 4/199
  pvc-in-range pvc1 3/104
   pppoe max-sessions 10
```

Related Commands

Command	Description
debug vpdn pppoe-errors	Displays PPPoE protocol errors that prevent a session from being established or errors that cause an established session to be closed.
pppoe limit max-sessions	Sets the maximum number of PPPoE sessions that will be permitted on a router, and sets the PPPoE session-count threshold at which an SNMP trap will be generated.
pppoe limit per-mac	Specifies the maximum number of PPPoE sessions to be sourced from a MAC address.
pppoe limit per-vc	Specifies the maximum number of PPPoE sessions permitted on all VCs.
pppoe limit per-vlan	Specifies the maximum number of PPPoE sessions permitted on a VLAN.
snmp-server enable traps pppoe	Enables PPPoE session-count SNMP notifications.

snmp-server enable traps pppoe

To enable PPPoE session count Simple Network Management Protocol (SNMP) notifications, use the **snmp-server enable traps pppoe** configuration command in global configuration mode. To disable PPPoE session count SNMP notifications, use the **no** form of this command.

snmp-server enable traps pppoe

no snmp-server enable traps pppoe

Syntax Description

This command has no arguments or keywords.

Defaults

SNMP notifications are disabled by default.

Command Modes

Global configuration

Command History

Release	Modification
12.2(1)DC	This command was introduced.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T.

Usage Guidelines

This command enables SNMP traps only. It does not support inform requests.

To configure the PPPoE session-count thresholds at which SNMP notifications will be sent, use the **pppoe limit max-sessions** or **pppoe max-sessions** commands.

For a complete description of this notification and additional MIB functions, see the CISCO-PPPOE-MIB.my file, available on Cisco.com at http://www.cisco.com/public/mibs/v2/.

Examples

The following example enables the router to send PPPoE session-count SNMP notifications to the host at the address 10.64.131.20:

```
snmp-server community public RW
snmp-server enable traps pppoe
snmp-server host 10.64.131.20 version 2c public udp-port 1717
```

Related Commands

Command	Description
pppoe limit max-sessions	Sets the maximum number of PPPoE sessions that will be permitted on a router, and sets the PPPoE session-count threshold at which an SNMP trap will be generated.
pppoe max-sessions	Sets the maximum number of PPPoE sessions that will be permitted on an ATM PVC, PVC range, VC class, or VLAN, and sets the PPPoE session-count threshold at which an SNMP trap will be generated.

Command	Description
snmp-server host	Specifies the recipient of an SNMP notification operation.
snmp-server trap-source	Specifies the interface from which an SNMP trap should originate.

Glossary

ATM—Asynchronous Transfer Mode. International standard for cell relay in which multiple service types (such as voice, video, or data) are conveyed in fixed-length cells. Fixed-length cells allow cell processing to occur in hardware, thereby reducing transit delays.

inform—An SNMP trap message that includes a delivery confirmation request. *See* trap.

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

NMS—network management system. An application or suite of applications designed to monitor networks using SNMP. CiscoView is one example of an NMS.

PPP—Point-to-point protocol. Successor to SLIP that provides router-to-router and host-to-network connections over synchronous and asynchronous circuits.

PVC—Permanent virtual circuit. Virtual circuit that is permanently established. PVCs save bandwidth associated with circuit establishment and teardown in situations in which certain virtual circuits must exist all the time.

SNMP—Simple Network Management Protocol. Management protocol used almost exclusively in TCP/IP networks. SNMP provides a means to monitor and control network devices and to manage configurations, statistics collection, performance, and security, typically through the use of an NMS.

trap—Message sent by an SNMP agent to a network management station, console, or terminal to indicate the occurrence of a significant event, such as a specifically defined condition or the reaching of a threshold.

VLAN—virtual LAN. Group of devices on one or more LANs that are configured (using management software) so that they can communicate as if they were attached to the same wire, when in fact they are located on a number of different LAN segments. Because VLANs are based on logical instead of physical connections, they are extremely flexible.

VPDN—virtual private dial-up network. *See also* VPN.

VPN—virtual private network. Enables IP traffic to travel securely over a public TCP/IP network by encrypting all traffic from one network to another. A VPN uses “tunneling” to encrypt all information at the IP level.