Autosense of MUX/SNAP Encapsulation and PPPoA/PPPoE on ATM PVCs

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History for the Autosense of MUX/SNAP Encapsulation and PPPoA/PPPoE on ATM PVCs Feature

Release	Modification
12.2(15)B	This feature was introduced.
12.2(28)SB	This feature was integrated into Cisco IOS Release 12.2(28)SB.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at http://www.cisco.com/go/fn. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

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Feature Overview

The Autosense of MUX/SNAP Encapsulation and PPPoA/PPPoE on ATM PVCs feature enhances PPP over ATM (PPPoA)/PPP over Ethernet (PPPoE) autosense functionality by providing autosense support on MUX- and SNAP-encapsulated ATM permanent virtual circuits (PVCs). Before the introduction of this feature, PPPoA/PPPoE autosense was supported on SNAP-encapsulated ATM PVCs only.

PPPoA/PPPoE autosense enables a router to distinguish between incoming PPP over ATM (PPPoA) and PPP over Ethernet (PPPoE) over ATM sessions and to create virtual access based on demand for both PPP types.

This feature is supported on MUX- and SNAP-encapsulated ATM PVCs and enables the PVC encapsulation type to be autosensed by the router. The router determines the encapsulation type of a PVC by looking at the encapsulation type of the first incoming packet. If the PVC encapsulation type is changed while the PPPoA or PPPoE session on the network access server (NAS) is still up, the incoming packet is dropped, the encapsulation type is reset to autosense, and all sessions are removed from the PVC. The next incoming packet will then determine the new encapsulation type of the PVC.

Benefits

The Autosense of PPPoA/PPPoE for MUX or SNAP Encapsulation feature provides resource allocation on demand. For each PVC configured for both PPPoA and PPPoE, certain resources (including one virtual-access interface) are allocated upon configuration, regardless of the existence of a PPPoA or PPPoE session on that PVC. With the Autosense of MUX/SNAP Encapsulation and PPPoA/PPPoE on ATM PVCs feature, resources are allocated for PPPoA and PPPoE sessions only when a client initiates a session, thus reducing overhead on the network access server (NAS).

This feature also saves configuration time by eliminating the need to specify the encapsulation type when provisioning ATM PVCs and by eliminating the need to manually provision ATM PVCs each time the encapsulation type changes.

Restrictions

- Do not use this feature on a router that initiates PPPoA sessions.
- This feature supports ATM PVCs. Switched virtual circuits (SVCs) are not supported.
- PPPoA does not support static IP assignments within virtual templates.

Configuration Tasks

See the following sections to configure the PPPoA/PPPoE Autosense for ATM PVCs feature. Each task in the list is identified as required or optional.

- Configuring PPPoA/PPPoE Autosense, page 3 (required)
- Verifying PPPoA/PPPoE Autosense Configuration, page 4 (optional)

Configuring PPPoA/PPPoE Autosense

PPPoA/PPPoE autosense can be configured on a single PVC or on a VC class that can be applied to all PVCs on an ATM interface.

Configuring PPPoA/PPPoE Autosense on an ATM PVC

To configure PPPoA/PPPoE Autosense on a PVC, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# interface atm number[.subinterface-number {multipoint | point-to-point}]`	Specifies the ATM interface and optional subinterface.
Step 2	`Router(config-subif)# pvc [name] vpi/vci`	Configures a PVC on the ATM interface or subinterface.
Step 3	`Router(config-if-atm-vc)# encapsulation aal5autoppp virtual-template number`	Configures PPPoA/PPPoE autosense on the PVC. Also specifies the virtual template interface to use to clone the new virtual-access interfaces for PPP sessions on this PVC.

Configuring PPPoA/PPPoE Autosense on a VC Class

To configure PPPoA/PPPoE autosense on a VC class, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# vc-class atm vc-class-name`	Creates and names a map class.
Step 2	`Router(config-vc-class)# encapsulation aal5autoppp virtual-template number`	Configures PPPoA/PPPoE autosense. Also specifies the virtual template interface to use to clone the new virtual-access interfaces for PPP sessions on this PVC.
Step 3	`Router(config-vc-class)# exit`	Returns to global configuration mode.
Step 4	`Router(config)# interface atm number[.subinterface-number {multipoint | point-to-point}]`	Specifies the ATM interface and optional subinterface.
Step 5	`Router(config-subif)# class-int vc-class-name`	Applies the VC class to all VCs on the ATM interface or subinterface.

Note Virtual-access interfaces for PPPoE sessions are cloned from the virtual template interface specified in the VPDN group.

Verifying PPPoA/PPPoE Autosense Configuration

To verify that you have successfully configured PPPoA/PPPoE autosense, use the **show running-config** command in the privileged EXEC mode.

Troubleshooting Tips

To troubleshoot PPP sessions establishment, use the following commands:

- **debug ppp authentication**
- **debug ppp negotiation**
- **debug vpdn pppoe-error**
- **debug vpdn pppoe-events**

To troubleshoot the establishment of PPP sessions that are authenticated by a RADIUS or TACACS server, use the following commands:

- **debug aaa authentication**
- **debug aaa authorization**

Caution Use **debug** commands with extreme caution because they are CPU-intensive and can seriously impact your network.

Monitoring and Maintaining PPPoA/PPPoE Autosense for ATM PVCs

To monitor and maintain PPPoA/PPPoE autosense, use the following commands in privileged EXEC mode:

Command	Purpose
`Router# show atm pvc [ppp]`	After the client at the other end of the PVC has initiated a PPPoA session, use this command to check that the PVC contains the PPPoA session.
`Router# show caller`	Displays caller information. Use this command to: • View individual users and consumed resources on the NAS. • Inspect active call statistics for large pools of connections. (The **debug** commands produce too much output and tax the CPU too heavily.) • Display the absolute and idle times for each user. The current values for both of these settings are displayed on the tty line and the asynchronous interface. Users that have been idle for unacceptably long periods of time can be easily identified. By using this information, you can define timeout policies and multiple grades of services for different users.
`Router# show interface virtual access number`	Displays information about the virtual-access interface, LCP[1], protocol states, and interface statistics. The status of the virtual-access interface should read: `Virtual-Access3 is up, line protocol is up`
`Router# show user`	Displays information about the active lines on the router.
`Router# show vpdn`	Displays information about active Level 2 Forwarding (L2F) Protocol tunnel and message identifiers in a VPDN[2].

1. LCP = link control protocol.
2. VPDN = virtual private dial-up network.

Configuration Examples

This section provides the following configuration examples:

- PPPoA/PPPoE Autosense on an ATM PVC Example, page 5
- PPPoA/PPPoE Autosense on a VC Class Example, page 6
- PPPoA/PPPoE Autosense on Multiple VC Classes and Virtual Templates Example, page 7

PPPoA/PPPoE Autosense on an ATM PVC Example

In the following example, the NAS is configured with PPPoA/PPPoE autosense on PVC 30/33:

```
! Configure PPP Autosense
!
interface ATM 0/0/0.33 multipoint
 pvc 30/33
 encapsulation aal5autoppp Virtual-Template1
!
! Configure PPPoE
!
vpdn enable
vpdn-group 1
 accept dialin
  protocol pppoe
  virtual-template 1
!
ip cef
interface virtual-template 1
 ip unnumbered fastethernet 0/0/0
 ip route-cache cef
!
interface fastethernet 0/0/0
 ip address 10.1.1.1 255.255.255.0
!
! Enable precloning for virtual-template 1
!
virtual-template 1 pre-clone 2000
```

PPPoA/PPPoE Autosense on a VC Class Example

In the following example, the NAS is configured with PPPoA/PPPoE autosense on the VC class called “MyClass.” ” MyClass” applies PPPoA/PPPoE autosense to all PVCs on the ATM 0/0/0.99 interface.

```
!
! Configure PPP Autosense
!
vc-class ATM MyClass
 encapsulation aal5autoppp Virtual-Template1
!
interface ATM 0/0/0.99 multipoint
  class-int MyClass
  no ip directed-broadcast
  pvc 20/40
  pvc 30/33
!
! Configure PPPoE
!
vpdn enable
vpdn-group 1
 accept dialin
  protocol pppoe
  virtual-template 1
!
ip cef
interface virtual-template 1
  ip unnumbered fastethernet 0/0/0
  ip route-cache cef
!
interface fastethernet 0/0/0
 ip address 10.1.1.1 255.255.255.0
!
! Enable precloning for virtual-template 1
!
virtual-template 1 pre-clone 2000
```

```
!
```

PPPoA/PPPoE Autosense on Multiple VC Classes and Virtual Templates Example

In the following example, PPPoA and PPPoE sessions are handled separately by two virtual templates.

```
ip cef
vpdn enable
!
vpdn-group 1
 accept-dialin
  protocol pppoe
  virtual-template 1
pppoe limit per-mac 1
pppoe limit per-vc 1
!
virtual-template 1 pre-clone 1500
virtual-template 2 pre-clone 1000
!
interface ATM0/0/0.3 multipoint
 no ip directed-broadcast
 class-int pppauto
!
interface ATM0/0/0.9 multipoint
 ip address 10.16.40.1 255.255.0.0
 no ip directed-broadcast
!
interface Virtual-Template1
 ip unnumbered ATM0/0/0.9
 ip route-cache cef
 no ip directed-broadcast
 peer default ip address pool pool-1
 ppp authentication pap
!
interface Virtual-Template2
 ip unnumbered ATM0/0/0.9
 ip route-cache cef
 no ip directed-broadcast
 peer default ip address pool pool-2
 ppp authentication chap
!
interface fastethernet 0/0/0
 ip address 10.1.1.1 255.255.255.0
!
vc-class atm pppauto
 encapsulation aal5autoppp Virtual-Template2
!
```

Note Whenever possible, it is preferable to configure PPPoA and PPPoE to use the same virtual template. Using separate virtual templates leads to the inefficient use of virtual access because the maximum number of virtual-access interfaces will have to be precloned twice: once for PPPoE and once for PPPoA. If PPPoA and PPPoE use the same virtual template, the maximum number of virtual-access interfaces can be precloned once and used for PPPoA and PPPoE as needed.

Additional References

The following sections provide references related to Autosense of MUX/SNAP Encapsulation and PPPoA/PPPoE on ATM PVCs.

Related Documents

Related Topic	Document Title
Configuring PPPoA and PPPoE	"Configuring Broadband Access: PPP and Routed Bridge Encapsulation" chapter in the *Cisco IOS Wide-Area Networking Configuration Guide*, Release 12.2
Wide-Area Networking commands	"Broadband Access: PPP and Routed Bridge Encapsulation Commands" chapter in the *Cisco IOS Wide-Area Networking Command Reference*, Release 12.2.

Standards

Standard	Title
None	—

MIBs

MIB	MIBs Link
None	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
None	—

Technical Assistance

Description	Link
The Cisco Technical Support & Documentation website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport

Command Reference

This section documents one modified command only.

- **encapsulation aal5autoppp virtual-template**

encapsulation aal5autoppp virtual-template

To enable PPPoA/PPPoE autosense, which enables a router to distinguish between incoming PPP over ATM (PPPoA) and PPP over Ethernet (PPPoE) sessions and create virtual access for both PPP types based on demand, use the **encapsulation aal5autoppp virtual-template** command in Interface-ATM-VC configuration or VC class configuration mode. To terminate the PPPoA or PPPoE session and to detach the virtual-access interface from the permanent virtual circuit (PVC), use the **no** form of this command.

encapsulation aal5autoppp virtual-template *template-number*

no encapsulation aal5autoppp virtual-template *template-number*

Syntax Description

template-number	Number of the virtual template that will be used to clone virtual-access interfaces for PPPoA sessions. The range is from 1 to 25.

Defaults

PPPoA/PPPoE autosense is not enabled.

Command Modes

Interface-ATM-VC configuration
VC class configuration

Command History

Release	Modification
12.1(1) DC1	This command was introduced on the node route processor (NRP) of the Cisco 6400 Universal Access Concentrator.
12.2(4)T	This command was integrated into Cisco IOS Release 12.2(4)T.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.

Usage Guidelines

This command functions only when the PPPoA sessions are LLC-encapsulated.

Note Do not use this command on a router that initiates PPPoA sessions.

Entering the **no encapsulation aal5autoppp virtual-template** command will terminate the PPPoA or PPPoE session and detach the virtual-access interface from the PVC.

Precloning is recommended for use with PPPoA/PPPoE autosense to improve router performance. If precloned virtual-access interfaces are not available when an incoming PPPoA or PPPoE session is identified, then a virtual-access interface will be created.

Whenever possible, it is preferable to configure PPPoA and PPPoE to use the same virtual template. Using separate virtual templates leads to the inefficient use of virtual access because the maximum number of virtual-access interfaces will have to be precloned twice: once for PPPoE and once for PPPoA. If PPPoA and PPPoE use the same virtual template, the maximum number of virtual-access interfaces can be precloned once and used for PPPoA and PPPoE as needed.

Examples

The following example enables PPPoA/PPPoE autosense on PVC 30/33 and specifies virtual-template 1 to be used for PPPoA sessions:

```
interface ATM 0/0/0.33 multipoint
 pvc 30/33
 encapsulation aal5autoppp Virtual-Template1
```

Related Commands

Command	Description
virtual-template pre-clone	Specifies the number of virtual-access interfaces to be created and cloned from a specific virtual template.

Glossary

cloning—Creating and configuring a virtual-access interface by applying a specific virtual template interface. The template is the source of the generic user information and router-dependent information. The result of cloning is a virtual-access interface configured with all the commands in the template.

LCP—Link control protocol. Protocol that establishes, configures, and tests data-link connections for use by PPP.

NAS—Network access server. A device providing local network access to users across a remote access network such as the Public Switched Telephone Network (PSTN).

PPP—Point-to-Point Protocol. A protocol that encapsulates network layer protocol information over point-to-point links. PPP is defined in RFC 1661.

PPPoA—PPP over ATM.

PPPoE—PPP over Ethernet.

precloning—Cloning a specified number of virtual-access interfaces from a virtual template at system startup or when the command is configured.

PVC—Permanent virtual circuit (or connection). Virtual circuit that is permanently established. PVCs save bandwidth associated with circuit establishment and teardown in situations where certain virtual circuits must exist all the time. In ATM terminology, called a permanent virtual connection.

VC—Virtual channel. Logical circuit created to ensure reliable communication between two network devices. A VC is defined by a VPI/VCI pair and can be either permanent (PVC) or switched (SVC).

virtual-access interface—Instance of a unique virtual interface that is created dynamically and exists temporarily. Virtual-access interfaces can be created and configured differently by different applications, such as virtual profiles and virtual private dialup networks. Virtual-access interfaces are cloned from virtual template interfaces.

virtual template interface—A logical interface configured with generic configuration information for a specific purpose or configuration common to specific users, plus router-dependent information. The template takes the form of a list of Cisco IOS interface commands that are applied to virtual-access interfaces, as needed.

VPDN—virtual private dial-up network. A system that permits dial-in networks to exist remotely from home networks, while giving the appearance of being directly connected.

Note See *Internetworking Terms and Acronyms* for terms not included in this glossary.