OAM Segment Endpoint

First Published: November 8, 2004
Last Updated: November 20, 2009

The OAM Segment Endpoint feature terminates segment Operation, Administration and Maintenance (OAM) cells arriving on the Layer 2 transport virtual circuit (VC). The OAM Segment Endpoint feature helps in checking the segment connectivity. This feature can be used with Any Transport over MPLS (AToM) and Layer 2 Tunnel Protocol Version 3 (L2TPv3).

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the "Feature Information for OAM Segment Endpoint" section on page 9.

Use Cisco Feature Navigator to find information about platform support and Cisco IOS and Catalyst OS software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Contents

- Prerequisites for OAM Segment Endpoint, page 2
- Restrictions for OAM Segment Endpoint, page 2
- Information About OAM Segment Endpoint, page 2
- How to Configure OAM Segment Endpoint, page 3
- Configuration Examples for OAM Segment Endpoint, page 5
- Additional References, page 7
- Feature Information for OAM Segment Endpoint, page 9
- Glossary, page 10

Americas Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

Prerequisites for OAM Segment Endpoint

This feature can be enabled under Layer 2 transport permanent virtual circuit (PVC) submode and virtual circuit (VC) class configuration mode.

Restrictions for OAM Segment Endpoint

The following restrictions apply to the OAM Segment Endpoint feature:

- The OAM attachment circuit (AC) segment endpoint configuration is applicable only in the case of Layer 2 transport virtual circuits (VCs)/virtual paths (VPs).
- In Cisco 7200 routers, by default the segment cells for VPs are handled in the provider edge (PE) and are not transported on the pseudowire transparently.
- In Cisco 12000 series Internet routers, the segment OAM cells in VCs with encapsulation ATM adaptation layer 5 (AAL5) are handled in the PE and are not transported on the pseudowire transparently.
- If OAM cell emulation is configured, OAM segment endpoint is redundant.

Information About OAM Segment Endpoint

To configure the OAM Segment Endpoint feature, you should understand the following concept:

- VP/VC Segment Endpoint, page 2

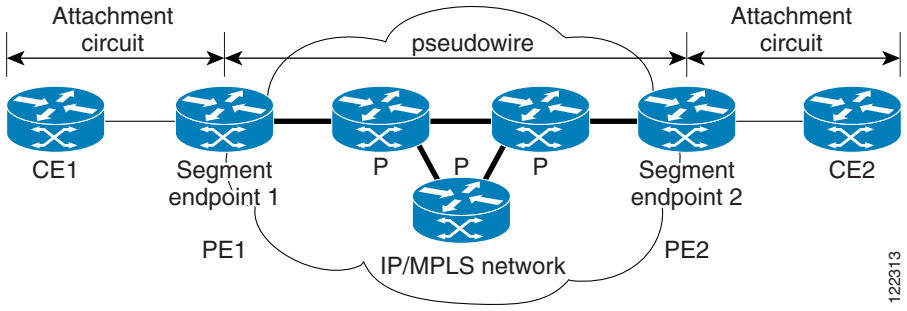
VP/VC Segment Endpoint

The Cisco 12000 series Internet router or Cisco 7200 router responds to the incoming segment cells, if the OAM Segment Endpoint feature is configured; otherwise they are transferred on the pseudowire.

Irrespective of whether the is feature is enabled or not, End OAM cells for both VPs and VCs are transferred on the pseudowire. To terminate End OAM cells, you need to enable OAM-emulation.

Figure 1 shows ATM transport over MPLS.

Figure 1 ATM Transport over MPLS



How to Configure OAM Segment Endpoint

See the following sections for tasks that use the **oam-ac segment endpoint** command to terminate the segment OAM cells on a VC:

- Configuring OAM Segment Endpoint, page 3 (required)
- Verifying OAM Segment Endpoint, page 4 (optional)

Configuring OAM Segment Endpoint

This feature coexists with OAM emulation for Layer 2 VCs. If OAM emulation is already enabled, segment endpoint configuration is redundant. On the Cisco 12000 series router, F4/F5 distributed Operations, Administration and Maintenance (dOAM) is enabled by default.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface atm** *slot/port.subinterface-number*
4. **pvc** *vpi/vci* **l2transport**
5. **oam-ac segment endpoint**
6. **encapsulation aal5**
7. **xconnect** *peer-router-id vcid* **encapsulation mpls**
8. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface atm** *slot/port.subinterface-number* **Example:** `Router(config)# interface atm1/1`	Enters ATM interface configuration mode.
Step 4	**pvc** *vpi/vci* **l2transport** **Example:** `Router(config-if)# pvc 0/100 l2transport`	Creates an ATM PVC and enters L2transport VC configuration mode.

	Command or Action	Purpose
Step 5	**oam-ac segment endpoint** **Example:** `Router(config-if-atm-l2trans-pvc)# oam-ac segment endpoint`	Terminates segment cells arriving on the Layer 2 transport VC.
Step 6	**encapsulation aal5** **Example:** `Router(config-if-atm-l2trans-pvc)# encapsulation aal5`	Specifies ATM AAL5 encapsulation for the PVC. • Make sure you specify the same encapsulation type on the PE and CE routers.
Step 7	**xconnect** *peer-router-id vcid* **encapsulation mpls** **Example:** `Router(config-if-atm-l2trans-pvc)# xconnect 192.0.2.10 100 encapsulation mpls`	Binds the attachment circuit to a pseudowire VC.
Step 8	**end** **Example:** `Router(cfg-if-atm-l2trans-pvc-xconn)# end`	Exits L2transport VC configuration mode and returns to privileged EXEC mode

Verifying OAM Segment Endpoint

To verify whether the OAM Segment Endpoint feature is working correctly, use the following steps to monitor the segment cells (arriving on the Layer 2 transport VC) that are being terminated on ATM links in a network.

SUMMARY STEPS

1. **enable**
2. **show atm pvc** [**ppp** | [**interface atm** *interface-number*[*.subinterface*]] [*connection-name* | *vpi*/*vci* [**vaccess** [**detail**]] | *vci*]]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show atm pvc** [**ppp**	[**interface atm** *interface-number*[*.subinterface*]] [*connection-name*	*vpi*/*vci* [**vaccess** [**detail**]]	*vci*]] **Example:** `Router# show atm pvc 0/100`	Displays all ATM PVCs and traffic information.

Configuration Examples for OAM Segment Endpoint

This section contains the following configuration and verification examples:

- OAM Segment Endpoint Configuration: Example, page 5
- Verification Examples, page 5

OAM Segment Endpoint Configuration: Example

VC Layer 2 Transport

```
Router(config)# interface atm1/1
Router(config-if)# pvc 0/100 l2transport
Router(cfg-if-atm-l2trans-pvc)# oam-ac segment endpoint
Router(cfg-if-atm-l2trans-pvc)# end
```

VC-Class Configuration

```
Router(config)# vc-class atm test
Router(config-vc-class)# oam-ac segment endpoint
Router(config-vc-class)# end
```

The following is sample output for the **show running-config interface** command:

```
Router# show running-config interface atm1/1

Building configuration...

Current configuration : 177 bytes
!
interface ATM1/1
 no ip address
 no ip directed-broadcast
 atm pvp 40 l2transport
  oam-ac segment endpoint
 no atm enable-ilmi-trap
 no atm ilmi-keepalive
 pvc 0/100 l2transport
  oam-ac segment endpoint
end

Router# show running-config
Building configuration...

Current configuration : 4251 bytes
!

vc-class atm test
  oam-ac segment endpoint
  oam-pvc manage
!
```

Verification Examples

The following is sample output from the **show atm pvc** command. It provides the segment OAM cell configuration and status information.

```
Router# show atm pvc 12/122

VC 12/122 doesn't exist on interface ATM1/0 - cannot display
VC 12/122 doesn't exist on interface ATM1/1 - cannot display
ATM1/2.3: VCD: 7, VPI: 12, VCI: 122
UBR, PeakRate: N/A (UBR VC)
AAL5 L2transport, etype:0xF, Flags: 0x10000C2E, VCmode: 0x0
OAM Cell Emulation: not configured
OAM Segment Endpoint: enabled
============> oam-ac segment endpoint enabled
Interworking Method: Not Configured
Remote Circuit Status = No Alarm, Alarm Type = None
InPkts: 0, OutPkts: 0, InBytes: 0, OutBytes: 0
InPRoc: 0, OutPRoc: 0
InFast: 0, OutFast: 0, InAS: 0, OutAS: 0
Out CLP=1 Pkts: 0
OAM cells received: 0
F5 InEndloop: 0, F5 InSegloop: 0,
F5 InEndcc: 0, F5 InSegcc: 0, F5 InAIS: 0, F5 InRDI: 0
OAM cells sent: 0
F5 OutEndloop: 0, F5 OutSegloop: 0,
F5 OutEndcc: 0, F5 OutSegcc: 0, F5 OutAIS: 0, F5 OutRDI: 0
OAM cell drops: 0
Status: UP


Router# show atm pvc 40/3

ATM1/1: VCD: 48, VPI: 40, VCI: 3
UBR, PeakRate: N/A (UBR VC)
AAL5-MUX, etype:0x0, Flags: 0xD2C, VCmode: 0x0
OAM frequency: 0 second(s), OAM retry frequency: 0 second(s) OAM up retry count: 0, OAM
down retry count: 0 OAM Segment Endpoint: enabled OAM END CC Activate retry count: 0, OAM
END CC Deactivate retry count: 0 OAM END CC retry frequency: 0 second(s), OAM SEGMENT CC
Activate retry count: 0, OAM SEGMENT CC Deactivate retry
count: 0
OAM SEGMENT CC retry frequency: 0 second(s),
OAM Loopback status: OAM Disabled
OAM VC state: Not Managed
ILMI VC state: Not Managed
OAM END CC status: OAM CC Ready
OAM END CC VC state: Not Managed
OAM SEGMENT CC status: OAM CC Ready
OAM SEGMENT CC VC state: Not Managed
InARP DISABLED
InPkts: 0, OutPkts: 0, InBytes: 0, OutBytes: 0
InPRoc: 0, OutPRoc: 0, Broadcasts: 0
InFast: 0, OutFast: 0, InAS: 0, OutAS: 0
Out CLP=1 Pkts: 0
OAM cells received: 0
F4 InEndloop: 0, F4 InSegloop: 0, F4 InAIS: 0, F4 InRDI: 0
OAM cells sent: 0
F4 OutEndloop: 0, F4 OutSegloop: 0, F4 OutAIS: 0, F4 OutRDI: 0 OAM cell drops: 0
Status: UP
```

Additional References

The following sections provide references related to the OAM Segment Endpoint feature.

Related Documents

Related Topic	Document Title
Cisco IOS commands	*Cisco IOS Master Commands List, All Releases*
ATM Commands	*Cisco IOS Asynchronous Transfer Mode Command Reference*
Any Transport over MPLS	*Any Transport over MPLS*
Detecting failures when using OAM cells and PVC management	*Troubleshooting PVC Failures When Using OAM Cells and PVC Management*
Layer 2 Tunnel Protocol Version 3	*Layer 2 Tunnel Protocol Version 3*
WAN configuration	*Cisco IOS Wide-Area Networking Configuration Guide*

Standards

Standards[1]	Title
IETF Specification	*Encapsulation Methods for Transport of Layer 2 Frames over MPLS*
IETF Specification	*Layer Two Tunneling Protocol (Version 3)*
IETF Specification	*Transport of Layer 2 Frames over MPLS*
ITU-T Specification I.610 (ITU-T specification for B-ISDN operation and maintenance principles and functions)	*I.610 Series I: B-ISDN Operation and Maintenance Principles and Functions*

1. Not all supported standards are listed.

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	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

RFCs	Title
RFC 2661	*Layer Two Tunneling Protocol "L2TP"*
RFC 3032	*MPLS Label Stack Encoding*

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for OAM Segment Endpoint

Table 1 lists the features in this module and provides links to specific configuration information.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note Table 1 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 1 Feature Information for OAM Segment Endpoint

Feature Name	Releases	Feature Information
OAM Segment Endpoint	12.0(30)S 12.2(33)SRE	The OAM Segment Endpoint feature terminates segment Operation, Administration and Maintenance (OAM) cells arriving on the Layer 2 transport virtual circuit (VC). The OAM Segment Endpoint feature helps in checking the segment connectivity. This feature can be used with Any Transport over MPLS (AToM) and Layer 2 Tunnel Protocol Version 3 (L2TPv3). The following sections provide information about this feature: • VP/VC Segment Endpoint, page 2 • Configuring OAM Segment Endpoint, page 3 The following commands were introduced or modified: **oam-ac segment endpoint, show atm pvc**.

Glossary

customer edge (CE) router—A router that belongs to a customer network, which connects to a provider edge (PE) router to utilize Multiprotocol Label Switching (MPLS) Virtual Private Network (VPN) network services.

provider edge (PE) router—Entry point into the service provider network. The PE router is typically deployed on the edge of the network and is administered by the service provider. The PE router is the redistribution point between Enhanced Interior Gateway Routing Protocol (EIGRP) and Border Gateway Protocol (BGP) in PE to CE networking.

pseudowire (PW)—A mechanism that carries the elements of an emulated service from one provider edge (PE) to one or more PEs over a packet-switched network (PSN).

VPN—virtual private network. Allows IP traffic to travel securely over public TCP/IP networks and the Internet by encapsulating and encrypting all IP packets. VPN uses a tunnel to encrypt all information at the IP level.

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