

ATM OAM Traffic Reduction

The ATM OAM Traffic Reduction feature is a mechanism for reducing overhead when loopback cells are being used for fault detection in bidirectional virtual circuits (VCs) over ATM.

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Prerequisites for ATM OAM Traffic Reduction

The Operations and Maintenance (OAM) loopback cells described in this document are defined in International Telecommunication Union (ITU) specification *I.610 SERIES I: INTEGRATED SERVICES DIGITAL NETWORK,Maintenance principles* , and understanding this specification is requisite to understanding the ATM OAM Traffic Reduction feature.

Restrictions for ATM OAM Traffic Reduction

- This feature supports only permanent virtual circuits (PVCs) for F5 END_TO_END OAM loopback cells. This feature is not applicable for F4 OAM cells, AIS/RDI cells, or F5 SEGMENT OAM loopback cells.
- This feature breaks OAM loopback functionality when there is a unidirectional breakage and when retry frequency is configured to be the same as the F5 OAM loopback frequency.

Information About ATM OAM Traffic Reduction

OAM Traffic Flow

The OAM management portion of a PVC sends OAM loopback cells at periodic intervals. When OAM management is enabled at both ends of the PVC, the cells are transmitted and looped back at both ends. This transmission is redundant, because the OAM cells travel through the same physical circuit twice.

In the figure below, assume PVCs are configured between router R1 and router R2 , and that OAM management is enabled on both ends of the PVC. Router R1, upon receiving OAM command cells from router R2, can stop its own OAM command cell transmission and can manage the link on the basis of incoming OAM command cells. Router R1 can reinitiate OAM command cell transmission upon discovering the absence of command cells from router R2.

Figure 1: ATM OAM Traffic Flow



When router R1 detects the first OAM command cell from router R2, time stamp T1 is noted. When the next OAM command cell is detected, time stamp T2 is noted. The interval T1 minus T2 provides the OAM the loopback frequency of router R2. The average value of this interval is taken by measuring it a random number of times. (The interval needs to be taken a random number of times to avoid a race condition that *might* happen when routers R1 and R2 implement this algorithm and the frequency is the same.)

At the end of the random time period, router R1 stops sending OAM command cells and starts the OAM traffic monitoring timer. This timer in router R1 checks for a change in interval frequency in router R2. If there is a change, the traffic monitoring timer is stopped and the VC goes into Retry mode and checks whether the link is still up. In Retry mode, OAM command loopback cells are transmitted at an interval of one per second for 3 seconds. If router R1 does not receive a response to the command cell, the link is changed to the Down state.

Note If ATM OAM traffic reduction is enabled on routers R1 and R2, then because of the random nature of the traffic reduction algorithm, either router can initiate OAM command cells and the other router will have to listen to the incoming OAM command cells. If this feature is enabled on only one router (R1, for example), then the frequency of that router must be greater than or equal to the interval frequency set in the other router (R2) in order for router R1 to stop sending OAM command cells. The ATM OAM Traffic Reduction feature is enabled by the **oam-pvc** command. When the **optimum** keyword is enabled, and when a change in the interval frequency of router R2 is detected, the VC initiates an OAM command cell from router R1 and does not go into the Retry mode immediately. If no response is obtained, the VC goes into the Retry mode and follows the OAM Retry procedure.

How to Configure ATM OAM Traffic Reduction

Configuring ATM OAM Traffic Reduction on an ATM Interface

To configure ATM OAM traffic reduction on an ATM interface, use the following commands .

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface atm** *interface-number* **.** *subinterface-number*
4. **pvc** *vpi* **/** *vci*
5. **oam-pvc** [*frequency* | **manage** [*frequency* [**auto-detect** [**optimum**] | **keep-vc-up** [**seg aisrdi failure**] | **loop-detection**]]]
6. **exit**

DETAILED STEPS

Procedure

	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** *interface-number* **.** *subinterface-number* **Example:** `Router(config)# interface atm 1/1/1.100`	Configures an ATM interface type and enters interface configuration mode.
Step 4	**pvc** *vpi* **/** *vci* **Example:** `Router(config-if)# pvc 0/100`	Assigns a name to an ATM PVC and enters ATM VC configuration mode.
Step 5	**oam-pvc** [*frequency*	**manage** [*frequency* [**auto-detect** [**optimum**]	**keep-vc-up** [**seg aisrdi failure**]	**loop-detection**]]] **Example:**	Enables end-to-end F5 OAM loopback cell generation and OAM management for an ATM PVC or VC class, including the ATM OAM Traffic Reduction feature.

	Command or Action	Purpose
	`Router(config-if-atm-vc)# oam-pvc manage auto-detect optimum`	• **auto-detect** --Initiates auto-detection of peer OAM command cells. • **optimum** --Configures an optimum mode so that when the traffic monitoring timer expires, the PVC sends an OAM command cell at the locally configured frequency instead of going into Retry mode immediately. If there is no response, the PVC goes into Retry mode.
Step 6	**exit** **Example:** `Router(config-if-atm-vc)# exit`	Exits the configuration mode. • Enter the **exit** command for each command mode to exit.

Configuring ATM OAM Traffic Reduction on a VC Class

To configure ATM OAM traffic reduction on a VC class, use the following commands.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **vc-class atm** *vc-class-name*
4. **oam-pvc** [*frequency* | **manage** [*frequency* [**auto-detect** [**optimum**] | **loop-detection**]]]
5. **exit**
6. **interface atm** *interface-number* **.** *subinterface-number*
7. **class-int** *vc-class-name*
8. **pvc** *vpi* **/** *vci*
9. **exit**

DETAILED STEPS

Procedure

	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.

	Command or Action	Purpose
Step 3	**vc-class atm** *vc-class-name* **Example:** `Router(config)# vc-class atm word`	Creates a VC class to an ATM VC bundle member.
Step 4	**oam-pvc** [*frequency* | **manage** [*frequency* [**auto-detect** [**optimum**] | **loop-detection**]]] **Example:** `Router(config-vc-class)# oam-pvc manage auto-detect optimum`	Enables end-to-end F5 OAM loopback cell generation and OAM management for an ATM PVC or VC class, including the ATM OAM Traffic Reduction feature. • **auto-detect** --Initiates autodetection of peer OAM command cells. • **optimum** --Configures an optimum mode so that when the traffic monitoring timer expires, the PVC sends an OAM command cell at the locally configured frequency instead of going into Retry mode. If there is no response, the PVC goes into Retry mode.
Step 5	**exit** **Example:** `Router(config-vc-class)# exit`	Exits the vc-class mode.
Step 6	**interface atm** *interface-number* **.** *subinterface-number* **Example:** `Router(config)# interface atm 1/1/2.100`	Configures an ATM interface and enters interface configuration mode.
Step 7	**class-int** *vc-class-name* **Example:** `Router(config-if)# class-int test`	Assigns a VC class to an ATM main interface.
Step 8	**pvc** *vpi* **/** *vci* **Example:** `Router(config-if)# pvc 0/100`	Creates an ATM PVC and attaches it to the designated network virtual path identifier (VPI) and virtual channel interface (VCI). In this case, more than one PVC is created.

Step 9	**exit**
	Example:
	`Router(config-if)# exit`
	`Router(config)# exit`
		Ends the configuration mode.
		• Enter the **exit** command for each command mode to exit.

Verifying ATM OAM Traffic Reduction

To verify that the ATM OAM Traffic Reduction feature is working, perform the following steps.

SUMMARY STEPS

1. **enable**
2. **show atm oam auto-detect** [**atm** *interface-number* **.** *subinterface-number*]
3. **show atm pvc** [**interface atm** *type number*[*vpi* / *vci* | *vci* | *word*] *vpi* / *vci* | *vci* | *word*]

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show atm oam auto-detect** [**atm** *interface-number* **.** *subinterface-number*] **Example:** `Router# show atm oam auto-detect atm 1/1/2.100`	(Optional) Displays the state of the OAM cells when the ATM OAM traffic reduction is enabled. • The **show atm oam auto-detect** command reports the number of VCs in autodetection mode and in OAM loopback mode.
Step 3	**show atm pvc** [**interface atm** *type number*[*vpi* / *vci*	*vci*	*word*] *vpi* / *vci*	*vci*	*word*] **Example:** `Router# show atm pvc`	(Optional) Displays ATM PVCs and traffic reduction information. The **show atm pvc** command reports the OAM autodetect state, the OAM peer frequency, and the time the last OAM command cell was received.

Configuration Examples for ATM OAM Traffic Reduction

ATM OAM Traffic Reduction on an ATM Interface Example

The following example enables ATM OAM traffic reduction on an ATM interface:

```
interface ATM1/1/1.100 point-to-point
 ip address 60.1.2.1 255.255.255.0
 no atm enable-ilmi-trap
 pvc 11/111
  oam-pvc manage auto-detect optimum
  encapsulation aal5snap
```

ATM OAM Traffic Reduction on a VC Class Example

The following example enables ATM OAM traffic reduction using a VC class:

```
vc-class atm oam-tests
```

```
 oam-pvc manage auto-detect optimum
interface ATM1/1/2.100 point-to-point
 ip address 60.1.3.1 255.255.255.0
 class-int oam-tests
 no atm enable-ilmi-trap
 pvc 12/222
  encapsulation aal5snap
```

Verify ATM OAM Traffic Reduction Example

In the following examples, the output is displayed for each command in the task.

Sample Output for the show atm oam auto-detect Command

The following is sample output from the **show atm oam auto-detect** command:

```
Router# show atm oam auto-detect atm 1/1/2.100

ATM OAM Auto Detect statistics on ATM1/1/2
Auto Detection statistics:
ATM OAM AUTO DETECT INIT : 1
ATM OAM SENDING MONITORING : 0
ATM OAM MONITORING : 0
OAM Loopback statistics:
 DownRetry : 0
 UpRetry : 0
 Verified : 1
 Not Verified : 0
 Verified and Not Monitoring: 1
Router#
```

Sample Output for the show atm pvc Command

The following is sample output from the **show atm pvc** command with ATM OAM traffic reduction enabled:

```
Router# show atm pvc 12/222

ATM1/1/2.100: VCD: 1, VPI: 12, VCI: 222
UBR, PeakRate: 149760 (353208 cps)
AAL5-LLC/SNAP, etype:0x0, Flags: 0x1840, VCmode: 0x0, Encapsize: 12
OAM frequency: 10 second(s), OAM retry frequency: 1 second(s)
OAM up retry count: 3, OAM down retry count: 5
OAM Loopback status: OAM Received
Last cell looped No
Loop detect state 0, Last cell looped 0, OAM Retries 0, Loop Retries 0
OAM VC Status: Verified
OAM Auto Detect state: ATM OAM AUTO DETECT INIT
OAM PEER frequency: 0 second(s)
```

Additional References for ATM OAM Traffic Reduction

Related Documents

Related Topic	Document Title

Related Topic	Document Title
ATM commands	*Cisco IOS Asynchronous Transfer Mode Command Reference*

MIBs

MIB	MIBs Link
None	To locate and download MIBs for selected platforms, Cisco software 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 Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for ATM OAM Traffic Reduction

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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

Table 1: Feature Information for ATM OAM Traffic Reduction

Feature Name	Releases	Feature Information
ATM OAM Traffic Reduction	Cisco IOS XE Release 2.3S Cisco IOS XE Release 3.14S	The ATM OAM Traffic Reduction feature is a mechanism for reducing overhead when loopback cells are being used for fault detection in bidirectional virtual circuits (VCs) over ATM. In Cisco IOS Release XE 3.14S, support for the ATM OAM Traffic Reduction feature was added on the 4451-X Integrated Services Router. The following commands were introduced or modified: **oam-pvc show atm oam auto-detect show atm pvc**