ATM PVC F5 OAM Recovery Traps

The ATM PVC F5 OAM Recovery Traps feature introduces Simple Network Management Protocol (SNMP) traps that notify the administrator when a permanent virtual circuit (PVC) has recovered from F5 Operation, Administration, and Maintenance (OAM) end-to-end loopback failures, F5 OAM continuity check (CC) failures, and F5 OAM alarm indication signal/remote defect indication (AIS/RDI) failures.

Feature History for the ATM PVC Recovery Traps Feature

Release	Modification
12.0(26)S	This feature was introduced.

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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Prerequisites for ATM PVC F5 OAM Recovery Traps

Extended ATM PVC up and down traps and ATM PVC traps for OAM F5 CC, OAM F5 AIS/RDI, and OAM F5 loopback failures and recoveries cannot be used at the same time as the legacy ATM PVC trap. The legacy ATM PVC trap must be disabled by using the **no snmp-server enable traps atm pvc** command before extended ATM PVC up and down traps and ATM PVC traps for OAM F5 CC, OAM F5 AIS/RDI, and OAM F5 loopback failures and recoveries can be configured.

OAM management must be enabled on the PVC before you can use any ATM PVC traps.

Restrictions for ATM PVC F5 OAM Recovery Traps

Cisco digital subscriber line access multiplexers (DSLAMs) and ATM switches (such as the Cisco LS1010) do not forward F5 OAM segment CC cells.

The F5 OAM recovery traps are supported for ATM PVCs only.

Information About ATM PVC F5 OAM Recovery Traps

To configure ATM PVC F5 OAM recovery traps, you should understand the following concepts:

- F5 OAM Recovery Traps for ATM PVCs, page 2
- Benefits of F5 OAM Recovery Traps for ATM PVCs, page 3

F5 OAM Recovery Traps for ATM PVCs

F5 OAM cells are used to detect connectivity failures and recoveries at the ATM layer. Before the introduction of this feature, Cisco IOS software provided support for SNMP traps (also called SNMP notifications) for F5 end-to-end loopback, F5 CC segment or end-to-end, and F5 AIS/RDI connectivity failures on a PVC. The ATM PVC F5 OAM Recovery Traps feature introduces SNMP traps that notify the network management system (NMS) when connectivity is restored to a PVC after the following types of failures:

- F5 OAM end-to-end loopback failures
- F5 OAM segment CC failures
- F5 OAM end-to-end CC failures
- F5 OAM segment AIS/RDI failures
- F5 OAM end-to-end AIS/RDI failures

Information in the traps includes the number of PVCs that recovered and time stamps indicating when the first and last recoveries occurred during the notification interval.

To limit the amount of traffic that can be generated by the F5 OAM failure and recovery traps, only one trap of each type can be generated in each trap interval. Each trap can report on multiple PVCs, and successive PVCs that have the same failure or recovery are reported as a range.

In addition to the traps, MIB tables are maintained to provide information about the failures and recoveries on PVCs.

For a complete description of the extended ATM PVC Trap MIB, including the supported notifications and tables, see the MIB file called CISCO-ATM-PVCTRAP-EXTN-MIB.my, available through Cisco.com at the following URL:

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

Benefits of F5 OAM Recovery Traps for ATM PVCs

Before the introduction of this feature, when F5 OAM failures were detected on PVCs, failure notifications were sent to the NMS, and the operational state of the PVC was kept up. There was no mechanism for notifying the NMS when connectivity was restored to the PVCs after F5 OAM failures. The F5 OAM Recovery Traps feature introduces traps that asynchronously notify the NMS when PVCs have recovered from F5 OAM failures.

How to Configure F5 OAM Recovery Traps for ATM PVCs

This section contains the following procedures:

- Configuring ATM OAM F5 CC Support, page 3
- Enabling OAM F5 Failure and Recovery Traps for ATM PVCs, page 5

Configuring ATM OAM F5 CC Support

Perform this task to configure ATM OAM F5 CC support on an ATM PVC.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface atm** *number*
4. **ip address** *ip-address mask*
5. **pvc** [*name*] *vpi*/*vci*
6. **oam-pvc manage cc** {**end** | **segment**} [**direction** {**both** | **sink** | **source**}] [**keep-vc-up** [**end aisrdi failure** | **seg aisrdi failure**]]
7. **oam retry cc** {**end** | **segment**} [*activation-count* [*deactivation-count* [*retry-frequency*]]]

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** *number* **Example:** `Router(config)# interface atm 0`	Specifies an interface for configuration and enters interface configuration mode.
Step 4	**ip address** *ip-address mask* **Example:** `Router(config-if)# ip address 10.0.0.3 255.255.255.0`	Sets a primary or secondary IP address for an interface.
Step 5	**pvc** [*name*] *vpi*/*vci* **Example:** `Router(config-if)# pvc 0/40`	Creates an ATM PVC and enters ATM virtual circuit configuration mode.
Step 6	**oam-pvc manage cc** {**end** | **segment**} [**direction** {**both** | **sink** | **source**}] [**keep-vc-up** [**end aisrdi failure** | **seg aisrdi failure**]] **Example:** `Router(config-if-atm-vc)# oam-pvc manage cc segment direction source`	Configures ATM OAM F5 CC management.
Step 7	**oam retry cc** {**end** | **segment**} [*activation-count* [*deactivation-count* [*retry-frequency*]]] **Example:** `Router(config-if-atm-vc)# oam retry cc segment 10 10 30`	Sets the retry count and the frequency at which CC activation and deactivation requests are sent to the device at the other end of the PVC or the segment.

Enabling OAM F5 Failure and Recovery Traps for ATM PVCs

Perform this task to enable the MIB and SNMP notifications that support ATM OAM F5 CC management.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **snmp-server enable traps atm pvc extension** {**up** | **down** | **oam failure** [**aisrdi** | **endcc** | **loopback** | **segmentcc**]}

DETAILED STEPS

	Command	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	**snmp-server enable traps atm pvc extension** {**up** | **down** | **oam failure** [**aisrdi** | **endcc** | **loopback** | **segmentcc**]} **Example:** `Router(config)# snmp-server enable traps atm pvc extension oam failure aisrdi`	Enables the following SNMP traps: ATM OAM F5 CC failure and recovery traps, ATM OAM F5 AIS/RDI failure and recovery traps, and ATM OAM F5 end-to-end loopback failure and recovery traps.

Troubleshooting Tips

Use the **show running-config** command to verify the configuration of ATM OAM F5 continuity check management.

Use the **show atm pvc** command to verify that ATM OAM F5 CC management is enabled and to display the continuity check state of the PVC.

Use the **debug atm oam cc** command to display ATM OAM F5 continuity checking activity.

Use the **debug snmp packet** command to display which SNMP traps are being generated.

Configuration Examples for ATM PVC F5 OAM Recovery Traps

ATM PVC F5 OAM Recovery Traps: Example

In the following example, ATM F5 OAM end-to-end CC and AIS/RDI failure and recovery notifications are enabled. If connectivity failures or recoveries from failures are detected on PVC 0/35, host 172.16.61.90 will receive the SNMP notifications.

```
! Configure SNMP support:
snmp-server community public ro
snmp-server host 172.16.61.90 traps version 2c public udp-port 1000
!
! Enable ATM PVC F5 OAM trap support:
snmp-server enable traps atm pvc extension oam failure aisrdi
snmp-server enable traps atm pvc extension oam failure endcc
snmp-server enable traps atm pvc extension oam failure loopback
!
! Enable OAM management:
interface atm 0
 pvc 0/35
  oam-pvc manage cc end
```

Note Enhanced Interior Gateway Routing Protocol (EIGRP) must be configured on the router if you want the notification packets to be sent to the NMS.

Additional References

The following sections provide references related to ATM PVC OAM F5 recovery traps.

Related Documents

Related Topic	Document Title
ATM OAM F5 CC management configuration and commands	*ATM OAM Support for F5 Continuity Check*, 12.0(24)S new feature document
OAM and ATM PVC trap support configuration tasks	"Configuring ATM" chapter of the *Cisco IOS Wide-Area Networking Configuration Guide*, Release 12.0
OAM and ATM PVC trap support commands	"ATM Commands" chapter of the *Cisco IOS Wide-Area Networking Command Reference*, Release 12.0
SNMP configuration tasks	"Configuring SNMP Support" chapter of the *Cisco IOS Configuration Fundamentals Configuration Guide*, Release 12.0
SNMP commands	"SNMP Commands" chapter of the *Cisco IOS Configuration Fundamentals Command Reference*, Release 12.0

Standards

Standards	Title
No new or modified standards are supported by this feature.	—

MIBs

MIBs	MIBs Link
• The MIB that supports the ATM OAM F5 CC failure and recovery traps is defined in the file CISCO-ATM-PVCTRAP-EXTN-MIB.my.	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
No new or modified RFCs are supported by this features.	—

Technical Assistance

Description	Link
Technical Assistance Center (TAC) home page, containing 30,000 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/public/support/tac/home.shtml

Command Reference

This section documents the **snmp-server enable traps atm pvc extension** command. All other commands used with this feature are documented in the Cisco IOS Release 12.0 command reference publications.

snmp-server enable traps atm pvc extension

To enable the sending of extended ATM permanent virtual circuit (PVC) SNMP notifications and SNMP notifications for ATM Operation, Administration, and Maintenance (OAM) F5 continuity check (CC), ATM OAM F5 alarm indication signals/remote defect indications (AIS/RDI), and loopback failures and recoveries, use the **snmp-server enable traps atm pvc extension** command in global configuration mode. To disable these SNMP notifications, use the **no** form of this command.

snmp-server enable traps atm pvc extension {**up** | **down** | **oam failure** [**aisrdi** | **endcc** | **loopback** | **segmentcc**]}

no snmp-server enable traps atm pvc extension{**up** | **down** | **oam failure** [**aisrdi** | **endcc** | **loopback** | **segmentcc**]}

Syntax Description

up	Enables ATM PVC up traps. These notifications are generated when a PVC changes from the DOWN to the UP state.
down	Enables ATM PVC down traps. These notifications are generated when a PVC changes from the UP to the DOWN state.
oam failure	Enables any ATM PVC F5 OAM failure and recovery traps. The failure notification is generated when any type of F5 OAM failure occurs on the PVC. The recovery notification is generated when the PVC recovers from the corresponding F5 OAM failure.
aisrdi	(Optional) Enables AIS/RDI F5 OAM failure and recovery traps. The failure notification is generated when an AIS/RDI F5 OAM failure occurs on the PVC. The recovery notification is generated when a PVC recovers from an AIS/RDI F5 OAM failure.
endcc	(Optional) Enables end-to-end F5 OAM CC failure and recovery traps. The failure notification is generated when an end-to-end F5 OAM CC failure occurs on the PVC. The recovery notification is generated when the PVC recovers from an end-to-end F5 OAM CC failure.
loopback	(Optional) Enables F5 OAM failure and recovery loopback traps. The failure notification is generated when an F5 OAM end-to-end loopback failure occurs on the PVC. The recovery notification is generated when the PVC recovers from an F5 OAM end-to-end loopback failure.
segmentcc	(Optional) Enables segment F5 OAM CC failure and recovery traps. The failure notification is generated when a segment F5 OAM CC failure occurs on the PVC. The recovery notification is generated when the PVC recovers from a segment F5 OAM CC failure.

Defaults

SNMP notifications are disabled.
The interval between successive traps is 30 seconds.

Command Modes

Global configuration

Command History

Release	Modification
12.2(4)T	This command was introduced for those platforms that support ATM PVC management.
12.2(13)T	This command was modified to configure SNMP notification support for ATM OAM F5 CC and ATM OAM F5 AIS/RDI failures.
12.0(24)S	This command was integrated into Cisco IOS Release 12.0(24)S.
12.0(26)S	This command was modified to configure SNMP notification support for ATM OAM F5 end-to-end loopback, ATM OAM F5 CC, and ATM OAM F5 AIS/RDI recoveries on PVCs.

Usage Guidelines

Extended ATM PVC up and down traps and ATM PVC traps for OAM F5 CC, OAM F5 AIS/RDI, and OAM F5 loopback failures and recoveries cannot be used at the same time as the legacy ATM PVC trap. The legacy ATM PVC trap must be disabled by using the **no snmp-server enable traps atm pvc** command before extended ATM PVC up and down traps and ATM PVC traps for OAM F5 CC, OAM F5 AIS/RDI, and OAM F5 loopback failures and recoveries can be configured.

OAM management must be enabled on the PVC before you can use ATM PVC traps. To generate F5 end-to-end loopback failure and recovery traps, enable OAM management using the **oam-pvc manage** command. To generate segment F5 CC failure and recovery traps, enable segment OAM CC management by using the **oam-pvc manage cc segment** command. To generate end-to-end F5 CC failure and recovery traps, enable end-to-end OAM CC management by using the **oam-pvc manage cc end** command. To generate OAM F5 AIS/RDI failure and recovery traps, enable any of the three types of OAM management listed above.

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

Enhanced Interior Gateway Routing Protocol (EIGRP) must be configured on the router if you want the notification packets to be sent to the network management system (NMS).

ATM PVC traps are generated only at the end of the notification interval. It is possible to generate multiple types of ATM PVC traps at the end of the same notification interval.

The **snmp-server enable traps atm pvc extension** 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.

When the ATM OAM F5 end-to-end loopback, AIS/RDI, or CC failure trap is enabled, the PVC remains in the UP state when an OAM loopback, AIS/RDI, or CC failure is detected, so that the flow of data will still be possible. If a trap is not enabled, the PVC will be placed in the DOWN state when the corresponding OAM loopback, AIS/RDI, or CC failure is detected.

Examples

ATM PVC Up and Down Traps: Example

The following example shows the ATM PVC up and down traps enabled on a router. If PVC 0/35 leaves the UP state or leaves the DOWN state, host 172.16.61.90 will receive the SNMP notifications.

```
! Configure SNMP support:
Router(config)# snmp-server community public ro
Router(config)# snmp-server host 172.16.61.90 traps version 2c public udp-port 1000

! Enable ATM PVC up and down traps:
Router(config)# snmp-server enable traps atm pvc extension down
```

```
Router(config)# snmp-server enable traps atm pvc extension up
!
! Enable OAM management:
Router(config)# interface atm 1/0.1
Router(config-if)# pvc 0/35
Router(config-if-atm-vc)# oam-pvc manage
```

ATM OAM F5 End-to-End Loopback Failure and Recovery Traps: Example

The following example shows the ATM OAM F5 end-to-end loopback failure and recovery traps enabled on a router. If PVC 0/35 has an F5 end-to-end loopback failure or recovery from a failure, host 172.16.61.90 will receive the SNMP notifications.

```
!
Router(config)# snmp-server community public ro
Router(config)# snmp-server host 172.16.61.90 traps version 2c public udp-port 1000
!
Router(config)# snmp-server enable traps atm pvc extension down
Router(config)# snmp-server enable traps atm pvc extension up
!
Router(config)# interface atm 1/0.1
Router(config-if)# pvc 0/35
Router(config-if-atm-vc)# oam-pvc manage
!
```

ATM OAM F5 CC Failure and Recovery Traps: Example

In the following example, ATM F5 OAM end-to-end and segment CC failure and recovery notifications are enabled. If ATM OAM F5 end-to-end or segment CC connectivity failures or failure recoveries are detected on PVC 0/35, host 172.16.61.90 will receive the SNMP notifications.

```
!
Router(config)# snmp-server community public ro
Router(config)# snmp-server host 172.16.61.90 traps version 2c public udp-port 1000
!
Router(config)# snmp-server enable traps atm pvc extension oam failure endcc
Router(config)# snmp-server enable traps atm pvc extension oam failure segmentcc
!
Router(config)# interface atm 0
Router(config-if)# pvc 0/35
Router(config-if-atm-vc)# oam-pvc manage cc end
Router(config-if-atm-vc)# oam-pvc manage cc segment
```

ATM OAM F5 AIS/RDI Failure and Recovery Traps: Example

In the following example, ATM OAM F5 AIS/RDI failure and recovery notifications are enabled. If ATM OAM F5 AIS/RDI connectivity failures or failure recoveries are detected on PVC 0/35, host 172.16.61.90 will receive the SNMP notifications.

```
!
Router(config)# snmp-server community public ro
Router(config)# snmp-server host 172.16.61.90 traps version 2c public udp-port 1000
!
Router(config)# snmp-server enable traps atm pvc extension oam failure aisrdi
!
Router(config)# interface atm 0
Router(config-if)# pvc 0/35
Router(config-if-atm-vc)# oam-pvc manage
```

Related Commands

Command	Description
oam-pvc manage	Enables end-to-end F5 OAM end-to-end loopback cell generation and OAM management.
oam-pvc manage cc	Configures ATM OAM F5 CC management.
show atm pvc	Displays all ATM PVCs and traffic information.
snmp-server enable traps	Enables all available SNMP notifications on your system.
snmp-server enable traps atm pvc	Enables the sending of legacy ATM PVC down traps.
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.