ATM OAM Support for F5 Continuity Check

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The ATM OAM Support of F5 Continuity Check feature provides the ability to detect connectivity failures at the ATM layer by introducing Operation, Administration, and Maintenance (OAM) support for F5 segment and end-to-end Continuity Check (CC) cells. This feature also enables network administrators to detect connectivity failures on each PVC. Simple Network Management Protocol (SNMP) notifications are generated when CC cells indicate virtual circuit (VC) connectivity failure and notify the administrator that continuity for a particular permanent virtual circuits (PVCs) has been lost while the PVC is still operationally up.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and 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 table at the end of this module.

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.

Prerequisites for ATM OAM Support for F5 Continuity Check

Extended ATM PVC and ATM OAM F5 CC traps 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**

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pvc command before extended ATM PVC traps and ATM OAM F5 CC traps can be configured. If the extended ATM PVC traps or ATM OAM F5 CC traps are enabled, you must disable them by using the **no snmp-server enable traps atm pvc extension** command before you can enable the legacy ATM PVC trap.

Restrictions for ATM OAM Support for F5 Continuity Check

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

The ATM OAM Support for F5 Continuity Check feature is supported on ATM PVCs only.

Information About ATM OAM Support for F5 Continuity Check

The ATM OAM Support for F5 Continuity Check feature introduces Operation, Administration, and Maintenance (OAM) support for the use of F5 segment and end-to-end Continuity Check (CC) cells to detect connectivity failures at the ATM layer. This feature also introduces new Simple Network Management Protocol (SNMP) notifications that are generated when CC cells indicate virtual circuit (VC) connectivity failure.

ATM OAM F5 CC cells provide an in-service tool optimized to detect connectivity problems at the VC level of the ATM layer. CC cells are sent between a router designated as the source location and a router designated as the sink location. The local router can be configured as the source, as the sink, or as both the source and the sink.

- This feature implements two types of OAM cells: CC cells for fault management and CC cells for activation and deactivation. Fault management cells detect connectivity failures. Activation and deactivation cells initiate the activation or deactivation of continuity checking.

The ATM OAM Support for F5 Continuity Check feature enables network administrators to detect connectivity failures on a per-PVC basis. The feature also provides support for SNMP notifications that notify the administrator that continuity for a particular PVC has been lost while the PVC is still operationally up.

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SNMP Support for ATM OAM F5 Continuity Checking

The ATM OAM Support for F5 Continuity Check feature introduces three new SNMP notifications that indicate CC segment, CC end-to-end, and alarm indication signal/remote defect indication (AIS/RDI) failures to the Network Management System (NMS). The notifications include information such as the number of OAM failures that occurred and time stamps showing when the first and last failures occurred during the notification interval for permanent virtual circuits (PVCs). In addition to notifications, MIB tables are maintained to provide information about the failures on PVCs.

How to Configure ATM OAM Support for F5 Continuity Check

Configuring ATM OAM F5 CC Support

Perform the following steps 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*]]]
8. **exit**

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:** **Example:** Router# configure terminal	Enters global configuration mode.
Step 3	**interface atm** *number* **Example:** Router(config)# interface atm 2/0	Specifies an interface for configuration and enters interface configuration mode.

	Command or Action	Purpose
Step 4	**ip address** *ip-address mask*	Sets a primary or secondary IP address for an interface.
	Example:	
	Router(config-if)# ip address 10.4.9.14 255.255.255.0	
Step 5	**pvc** [*name*] *vpi/vci*	Creates an ATM PVC and enters ATM virtual circuit configuration mode.
	Example:	
	Router(config-if)# pvc oam 0/5	
Step 6	**oam-pvc manage cc** {**end**	**segment**} [**direction** {**both**	**sink**	**source**}] [**keep-vc-up** [**end aisrdi failure**	**seg aisrdi failure**]]	Configures ATM OAM F5 CC management.
	Example:	
	Router(config-if-atm-vc)# oam pvc manage cc segment direction both	
Step 7	**oam retry cc** {**end**	**segment**} [*activation-count* [*deactivation-count* [*retry-frequency*]]]	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.
	Example:	
	Router(config-if-atm-vc)# oam retry cc end 5	
Step 8	**exit**	Exits ATM virtual circuit configuration mode and returns to interface configuration mode.
	Example:	
	Router(config-if-atm-vc)# exit	

Configuring Denial of ATM OAM F5 CC Activation Requests

Perform the following steps to disable ATM OAM F5 CC support on an ATM PVC and to configure the PVC to deny OAM F5 CC activation requests.

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**} **deny**
7. **exit**

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 2/0	Specifies an interface for configuration and enters interface configuration mode.
Step 4	**ip address** *ip-address mask* **Example:** Router(config-if)#ip address 10.4.9.14 255.255.255.0	Sets a primary or secondary IP address for an interface.
Step 5	**pvc** [*name*] *vpi/vci* **Example:** Router(config-if)# pvc oam 0/5	Creates an ATM PVC and enters ATM virtual circuit configuration mode.

	Command or Action	Purpose
Step 6	**oam-pvc manage cc** {**end**	**segment**} **deny**	Disables ATM OAM F5 CC support by configuring the VC to deny CC activation requests.
	Example:	
	Router(config-if-atm-vc)# oam-pvc manage cc end deny	
Step 7	**exit**	Exits ATM virtual circuit configuration mode and returns to interface configuration mode.
	Example:	
	Router(config-if-atm-vc)# exit	

Configuring ATM OAM F5 CC Deactivation Requests

Perform the following steps to configure a PVC to send ATM OAM F5 CC deactivation requests when the PVC is already down.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface atm** *number*
4. **ip address** *ip-address mask*
5. **pvc** [*name*] *vpi*/*vci*
6. **no oam-pvc manage cc** {**end** | **segment**} [**deactivate-down-vc**]
7. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable**	Enables privileged EXEC mode.
		• Enter your password if prompted.
	Example:	
	Router> enable	
Step 2	**configure terminal**	Enters global configuration mode.
	Example:	
	Router# configure terminal	

Command or Action	Purpose
Step 3 **interface atm** *number* **Example:** `Router(config)#interface atm 2/0`	Specifies an interface for configuration and enters interface configuration mode.
Step 4 **ip address** *ip-address mask* **Example:** `Router(config-if)#ip address 10.4.9.14 255.255.255.0`	Sets a primary or secondary IP address for an interface.
Step 5 **pvc** [*name*] *vpi/vci* **Example:** `Router(config-if)# pvc oam 0/5`	Creates an ATM PVC and enters ATM virtual circuit configuration mode.

Step 6 **no oam-pvc manage cc** {**end** | **segment**} [**deactivate-down-vc**]
 	
Example:
 	
`Router(config-if-atm-vc)# no oma-pvc manage cc end`
`deactivate-down-vc`
	Configures the PVC to send deactivation requests if the PVC is already in down state.

Step 7 **exit** **Example:** `Router(config-if-atm-vc)# exit`	Exits ATM virtual circuit configuration mode and returns to interface configuration mode.

Configuring SNMP Notification for ATM OAM F5 CC Management

Perform the following steps to enable the MIB and send SNMP notifications that support ATM OAM F5 CC management.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **snmp-server enable traps atm pvc extension mibversion 2**
4. **snmp-server enable traps atm pvc extension {up** \| **down** \| **oam failure** [**aisrdi** \| **endCC** \| **loopback** \| **segmentCC**]}
5. **exit**

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	**snmp-server enable traps atm pvc extension mibversion 2** **Example:** Router(config)# snmp-server enable traps atm pvc extension mibversion 2	Specifies the MIB that supports the SNMP notifications for ATM OAM F5 CC management.
Step 4	**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 sending of extended ATM PVC, ATM OAM F5 CC, ATM OAM F5 AIS/RDI, and ATM OAM F5 Loopback SNMP notifications.
Step 5	**exit** **Example:** Router(config)# exit	Exits the global configuration mode and returns to privileged EXEC mode.

Verifying ATM OAM Support for F5 CC Management

To verify the configuration and operation of ATM OAM F5 CC management, perform the following steps:

SUMMARY STEPS

1. Use the **show running-config** command to verify configuration. The following is sample output for the **show running-config** command:
2. Use the **show atm pvc** command to verify that ATM OAM F5 CC management is enabled and to display the activation and deactivation retry counts and retry frequency values. This command also displays the CC state of the PVC.

DETAILED STEPS

Step 1 Use the **show running-config** command to verify configuration. The following is sample output for the **show running-config** command:

Example:

```
Router# show running-config interface atm0

Building configuration...
Current configuration :152 bytes
!
interface ATM0
 no ip address
 shutdown
 no atm ilmi-keepalive
 pvc 1/40
  oam-pvc manage cc segment direction both
 !
 dsl operating-mode auto
end
```

Step 2 Use the **show atm pvc**command to verify that ATM OAM F5 CC management is enabled and to display the activation and deactivation retry counts and retry frequency values. This command also displays the CC state of the PVC.

The following is sample output for the **show atm pvc** command:

Example:

```
Router# show atm pvc 1/40

ATM0:VCD:1, VPI:1, VCI:40
UBR, PeakRate:0
AAL5-LLC/SNAP, etype:0x0, Flags:0xC20, VCmode:0x0
OAM frequency:0 second(s), OAM retry frequency:1 second(s)
OAM up retry count:3, OAM down retry count:5
OAM END CC Activate retry count:3, OAM END CC Deactivate retry count:3
OAM END CC retry frequency:30 second(s),
OAM SEGMENT CC Activate retry count:3, OAM SEGMENT CC Deactivate retry count:3
OAM SEGMENT CC retry frequency:30 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:Verified
OAM SEGMENT CC status:OAM CC Active
OAM SEGMENT CC VC state:Verified
InARP frequency:15 minutes(s)
InPkts:0, OutPkts:0, InBytes:0, OutBytes:0
InPRoc:0, OutPRoc:0, Broadcasts:0
InFast:0, OutFast:0, InAS:0, OutAS:0
Giants:0
OAM cells received:20
F5 InEndloop:0, F5 InSegloop:0,
F5 InEndcc:0, F5 InSegcc:20, F5 InAIS:0, F5 InRDI:0
F4 InEndloop:0, F4 InSegloop:0, F4 InAIS:0, F4 InRDI:0
OAM cells sent:20
F5 OutEndloop:0, F5 OutSegloop:0,
F5 OutEndcc:0, F5 OutSegcc:20, F5 OutRDI:0
F4 OutEndloop:0, F4 OutSegloop:0, F4 OutRDI:0
OAM cell drops:1
Status:UP
```

Configuration Examples for ATM OAM Support for F5 Continuity Check

ATM OAM F5 CC Support on a PVC Configuration Example

The following example shows how to configure ATM OAM CC support over the segment and configure the router to function as the source. The frequency at which CC activation and deactivation requests will be sent over the segment is also configured.

```
interface atm 0
 ip address 10.0.0.3 255.255.255.0
 pvc 0/40
  oam-pvc manage cc segment direction source
  oam retry cc segment 10 10 30
```

Denial of ATM OAM F5 CC Activation Requests Example

The following example shows how to disable ATM OAM F5 CC support and configure the VC to deny CC activation requests:

```
interface atm 0
 ip address 10.0.0.3 255.255.255.0
 pvc 0/40
  oam-pvc manage cc segment deny
```

Deactivation of ATM OAM F5 CC Deactivation Requests Example

The following example shows how to send a CC deactivation request across the segment when PVC 0/40 goes down:

```
interface atm 0
 ip address 10.0.0.3 255.255.255.0
 pvc 0/40
  no oam-pvc manage cc segment deactivate-down-vc
```

SNMP Notifications for ATM OAM F5 CC Configuration Example

In the following example, the ATM OAM F5 CC notifications and an extended ATM PVC notification are enabled. If CC cells detect connectivity failures on PVC 0/40, host 172.16.61.90 will receive the SNMP notifications.

```
! Configure SNMP support on your router:
```

```
snmp-server community public
snmp-server host 172.16.61.90 public
!
! Enable SNMP notifications:
snmp-server enable traps atm pvc extension mibversion 2
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 segmentcc
snmp-server enable traps atm pvc extension oam failure loopback
snmp-server enable traps atm pvc extension up
```

Additional References

The following sections provide references related to the ATM OAM Support for F5 Continuity Check feature.

Related Documents

Related Topic	Document Title
Configuring ATM	"Configuring ATM"
ATM commands	*Cisco IOS Asynchronous Transfer Mode Command Reference*
Configuring SNMP support	"Configuring SNMP Support"
SNMP commands	*Cisco IOS Network Management Command Reference*

Standards

Standard	Title
No new or modified standards are supported by this feature.	--

MIBs

MIB	MIBs Link
• ATM PVC MIB • CISCO-ATM-PVCTRAP-EXTN-MIB • CISCO-IETF-ATM2-PVCTRAP-MIB	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
No new or modified RFCs are supported by this feature.	--

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/techsupport

Command Reference

The following commands are introduced or modified in the feature or features documented in this module. For information about these commands, see the *Cisco IOS Asynchronous Transfer Mode Command Reference*. For information about all Cisco IOS commands, use the Command Lookup Tool at http://tools.cisco.com/Support/CLILookup or the *Cisco IOS Master Command List, All Releases*, at http://www.cisco.com/en/US/docs/ios/mcl/allreleasemcl/all_book.html.

Feature Information for ATM OAM Support for F5 Continuity Check

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 Support for F5 Continuity Check*

Feature Name	Releases	Feature Information
ATM OAM Support for F5 Continuity Check	12.2(13)T	The ATM OAM Support for F5 Continuity Check feature introduces three new SNMP notifications that indicate failures to the network management system (NMS). This feature was introduced in 12.2(13)T that supported Cisco 827 and 1700 series. The following commands were introduced or modified: **debug atm oam cc**, **oam-pvc manage cc**, o**am-pvc manage cc deny**, **oam retry cc**, **snmp-server enable traps atm pvc extension**, **snmp-server enable traps atm pvc extension mibversion**.

Glossary

AIS --alarm indication signal. In a T1 transmission, an all-ones signal transmitted in lieu of the normal signal to maintain transmission continuity and to indicate to the receiving terminal that there is a transmission fault that is located either at or upstream from the transmitting terminal.

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).

NMS --network management system. An application or suite of applications designed to monitor networks using SNMP.

OAM --Operation, Administration, and Maintenance. OAM cells provide a virtual-circuit-level loopback in which a router responds to the cells, demonstrating that the circuit is up and the router is operational.

PVC --permanent virtual circuit. Virtual circuit that is permanently established. In ATM terminology, PVC also stands for permanent virtual connection.

RDI --remote defect indication. In ATM, when the physical layer detects loss of signal or cell synchronization, RDI cells are used to report a virtual path connection/virtual channel connection (VPC/VCC) failure. RDI cells are sent upstream by a VPC/VCC endpoint to notify the source VPC/VCC endpoint of the downstream failure.

SNMP --Simple Network Management Protocol. An application-layer protocol that provides a message format for communication between SNMP managers and agents and is 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.

SNMP trap --Message from an SNMP agent alerting the SNMP manager to a condition on the network.