

VC Integrity Management

Functional Description

The VC Integrity Management subfeature allows the router to receive immediate notification when ATM PVCs come down in the network. This notification can allow protocols to reroute packets immediately, preventing protocols from waiting for unpredictable and relatively long timeout periods.

How VC Integrity Management Works

VC Integrity Management manages PVCs such that connections and disconnections of PVCs are detected automatically by using Interim Local Management Interface (ILMI) and Operation, Administration, and Maintenance (OAM). Users may use ILMI or OAM or both for VC Integrity Management. You must decide which method is reliable in your particular network.

Data traffic will not flow until a PVC is declared up. When ILMI and OAM are configured to manage a PVC, both must indicate that a PVC is up in order for that PVC to be determined as up. If ILMI or OAM is not configured, VC Integrity Management uses only the configured management method.

When a PVC goes down, route caches for protocols configured on that PVC are cleared (or flushed) so that new routes may be learned. The route cache flush is applied on the PVC's interface. When all PVCs on a subinterface go down, VC Integrity Management shuts down the subinterface in addition to flushing route caches. ATM hardware must keep the PVC active, however, so that OAM and ILMI cells may flow. When any PVC on a subinterface comes up, the subinterface is brought up.

Configuration Tasks

To configure VC Integrity Management with ILMI or OAM or both, perform the tasks in one or both of the first two sections listed below. The third section is optional.

- Configure ILMI Management
- Configure OAM Management
- Monitor and Maintain ATM PVCs and SVCs (optional)

VC Integrity Management using ILMI is also referred to as ILMI management. VC Integrity Management using OAM is referred to as OAM management.

Refer to the “Enhanced ATM VC Configuration and Management Commands” chapter for command reference and debug command documentation.

Configure ILMI Management

If ILMI is used for VC Integrity Management, one ILMI PVC must be configured.

To configure ILMI management, perform the following tasks starting in global configuration mode:

Task	Command
Step 1 Specify the ATM main interface for creating the ILMI PVC for one of the following: <ul style="list-style-type: none"> • AIP on Cisco 7500 series routers and ATM port adapter on the Cisco 7200 series routers • NPM on Cisco 4500 and 4700 routers • ATM port adapter on Cisco 7500 series routers 	interface atm slot# interface atm number interface atm slot/port-adapter#
Step 2 Create an ILMI PVC.	pvc [name] vplvci ilmi
Step 3 (Optional) Specify the ATM subinterface of the PVC you want to manage. <ul style="list-style-type: none"> • AIP on Cisco 7500 series routers and ATM port adapter on the Cisco 7200 series routers • NPM on Cisco 4500 and 4700 routers • ATM port adapter on Cisco 7500 series routers 	interface atm slot#.subinterface-number multipoint interface atm number.subinterface-number multipoint interface atm slot/port-adapter#.subinterface-number multipoint
Step 4 Specify the PVC to be managed.	pvc [name] vplvci
Step 5 Enable ILMI management on the PVC.	ilmi manage

Repeat Steps 3 through 5 for each PVC you want to manage.

The PVC comes up only if ILMI indicates the PVC is up. The PVC comes down when ILMI indicates that the PVC is down.

Configure OAM Management

OAM may be enabled for PVC or SVC management. To configure OAM management for an ATM PVC, perform the following tasks starting in global configuration mode:

Task	Command
Step 1 Specify the ATM interface or subinterface for one of the following: <ul style="list-style-type: none"> • AIP on Cisco 7500 series routers and ATM port adapter on the Cisco 7200 series routers • NPM on Cisco 4500 and 4700 routers • ATM port adapter on Cisco 7500 series routers 	interface atm slot <i>0</i> [<i>.subinterface-number</i> multipoint] interface atm number [<i>.subinterface-number</i> multipoint] interface atm slot <i>port-adapter</i> <i>0</i> [<i>.subinterface-number</i> multipoint]
Step 2 Specify an ATM PVC.	pvc [<i>name</i>] <i>vpi/vci</i>
Step 3 Enable OAM management.	oam-pvc manage [<i>frequency</i>]
Step 4 (Optional) Specify OAM management parameters for re-establishing and removing a PVC connection.	oam retry <i>up-count</i> <i>down-count</i> <i>retry-frequency</i>

Use the *up-count* argument to specify the number of consecutive end-to-end F5 OAM loopback cell responses that must be received in order to change a PVC connection state to up. Use the *down-count* argument to specify the number of consecutive end-to-end F5 OAM loopback cell responses that are not received in order to tear down a PVC. Use the *retry-frequency* argument to specify the frequency (in seconds) that end-to-end F5 OAM loopback cells should be transmitted when a change in UP/DOWN state is being verified. For example, if a PVC is up and a loopback cell response is not received after the *frequency* (in seconds) specified using the **oam-pvc** command, then loopback cells are sent at the *retry-frequency* to verify whether or not the PVC is down.

By default, end-to-end F5 OAM loopback cell generation is turned off for each PVC. A PVC is determined as down when any of the following is true on that PVC:

- The router does not receive a loopback reply after a configured number of retries of sending end-to-end F5 OAM loopback cells.
- The router receives a Virtual Circuit-Alarm Indication Signals (VC-AIS) cell.
- The router receives a Virtual Circuit-Remote Detect Indicator (VC-RDI) cell.

A PVC is determined as up when all of the following are true on that PVC:

- The router receives a configured number of successive end-to-end F5 OAM loopback cell replies.
- The router does not receive VC-AIS cell for 3 seconds.
- The router does not receive VC-RDI cell for 3 seconds.

To configure OAM management for an ATM SVC, perform the following tasks starting in global configuration mode:

Task	Command
Step 1 Specify the ATM interface or subinterface for one of the following: <ul style="list-style-type: none"> • AIP on Cisco 7500 series routers and ATM port adapter on the Cisco 7200 series routers • NPM on Cisco 4500 and 4700 routers • ATM port adapter on Cisco 7500 series routers 	interface atm slot0[.subinterface-number multipoint] interface atm number[.subinterface-number multipoint] interface atm slot/port-adapter/0[.subinterface-number multipoint]
Step 2 Specify an ATM SVC.	svc [name] nsap address
Step 3 Enable OAM management.	oam-svc manage [frequency]
Step 4 (Optional) Specify OAM management parameters for re-establishing and removing a PVC connection.	oam retry up-count down-count retry-frequency

If OAM management is enabled on SVCs and detects disconnection on an SVC, that SVC is torn down.

The *up-count* argument does not apply to SVCs, but it must be specified in order to configure the *down-count* and *retry-frequency*. Use the *down-count* argument to specify the number of consecutive end-to-end F5 OAM loopback cell responses that are not received in order to tear down an SVC. Use the *retry-frequency* argument to specify the frequency (in seconds) that end-to-end F5 OAM loopback cells should be transmitted when a change in UP/DOWN state is being verified. For example, if an SVC is up and a loopback cell response is not received after the *frequency* (in seconds) specified using the **oam-svc** command, then loopback cells are sent at the *retry-frequency* to verify whether or not the SVC is down.

Monitor and Maintain ATM PVCs and SVCs

After configuring an ILMI or OAM management on an ATM PVC or SVC, you can display its status. To show current ILMI, OAM, PVC, and SVC statistics, perform the following tasks in privileged EXEC mode:

Task	Command
Display current OAM statistics and global ATM traffic information to and from all ATM networks connected to the router.	show atm traffic
Display current ILMI, OAM, and traffic information for a specified ATM PVC.	show atm pvc {vpilvci name interface atm interface-number}
Display current ILMI, OAM, and traffic information for a specified ATM SVC.	show atm svc {vpilvci name interface atm interface-number}
Specify that incoming OAM cells be flushed on an ATM interface.	atm oam flush

To flush all incoming OAM cells on an ATM interface, perform the following tasks starting in global configuration mode:

Task	Command
Step 1 Specify the ATM interface for one of the following: <ul style="list-style-type: none"> • AIP on Cisco 7500 series routers and ATM port adapter on the Cisco 7200 series routers • NPM on Cisco 4500 and 4700 routers • ATM port adapter on Cisco 7500 series routers 	interface atm slot# interface atm number interface atm slot/port-adapter#
Step 2 Specify that incoming OAM cells be flushed on the ATM interface.	atm oam flush

The **atm oam flush** command is a diagnostic tool that clears all OAM cells that are received on an ATM interface.

Configuration Examples

The examples in the following sections illustrate how to configure ILMI and OAM management on an ATM PVCs and SVCs:

- ILMI Management on an ATM PVC Example
- OAM Management on an ATM PVC Example
- OAM Management on an ATM SVC Example

ILMI Management on an ATM PVC Example

The following example enables ILMI management on the ATM PVC with VPI 0 and VCI 60. The ILMI PVC is assigned the name routerA and the VPI and VCI are 0 and 16, respectively. For further information, refer to the related task section “Configure ILMI Management” presented earlier in this document.

```
interface atm 0/0
 pvc routerA 0/16 ilmi
 exit
!
interface atm 0/0.1 multipoint
 pvc 0/60
 ilmi manage
```

OAM Management on an ATM PVC Example

The following example enables OAM management on an ATM PVC. The PVC is assigned the name routerA and the VPI and VCI are 0 and 32, respectively. OAM management is enabled with a frequency of 3 seconds between OAM cell transmissions. For further information, refer to the related task section “Configure OAM Management” presented earlier in this document.

```
interface atm 2/0
 pvc routerA 0/32
  oam-pvc manage 3
  oam retry 5 5 10
```

OAM Management on an ATM SVC Example

The following example enables OAM management on an ATM SVC. The SVC is assigned the name routerZ and the destination NSAP address is specified. OAM management is enabled with a frequency of 3 seconds between OAM cell transmissions. For further information, refer to the related task section “Configure OAM Management” presented earlier in this document.

```
interface atm 1/0
 svc routerZ nsap 47.0091.81.000000.0040.0B0A.2501.ABC1.3333.3333.05
  oam-svc manage 3
  oam retry 5 5 10
```