Configuring ATM Interfaces on Cisco IOS XR Software

This module describes how to configure ATM on the Cisco CRS Router using Cisco IOS XR software. ATM is a cell-switching and multiplexing technology that is widely used in Wide Area Networks (WANs). ATM protocol standards enable point-to-point, point-to-multipoint, and broadcast services connections using various slow- and high-speed network media. Connectivity between two ATM permanent virtual circuits (PVCs) is established using ATM signaling mechanisms. Various ATM signaling standards are defined by these ATM forum standards:

- UNI Version 3.0, Version 3.1, and Version 4.0
- ITU
- IETF

Feature History for Configuring Bidirectional Forwarding Detection on Cisco IOS XR Software

Release	Modification
Release 3.7.0	ATM Layer 2 VPN (Port Mode) and QoS was introduced on the following SPAs: • 3-Port Clear Channel OC-3 ATM SPA • 1-Port Clear Channel OC-12 ATM SPA

Release 3.8.0	Support for ATM over MPLS was added.
Release 3.9.2	Support for ATM UNI (Layer 3 VPN) was added for the following SPAs: • 1-Port Clear Channel OC-3 ATM SPA • 3-Port Clear Channel OC-3 ATM SPA • 1-Port Clear Channel OC-12 ATM SPA The following ATM UNI features are supported in this release: • ATM UNI L3 VC termination (UNI 3.0/3.1) • ILMI • Per VC QoS • ATM COS • MPLS L3VPN per VC sub-interface • Support for both L2VPN and L3VPN under the same physical interface • ATM F4/F5 OAM • MR-APS • IGP routing with VRF/VPN support: OSPF, BGP, EIGRP, RIP and static • 150 VC/VP connections per port, maximum VC/VP numbering up to 1024

Contents

Prerequisites for Implementing ATM

You must be in a user group associated with a task group that includes the proper task IDs. The command reference guides include the task IDs required for each command. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Information About ATM

This section provides overviews of these features:

Network nodes use ATM connections to transfer bits of data organized as 53-byte ATM cells. User information (such as voice, video, and data) is segmented into ATM cells on one end of the connection, and then reassembled on the other end of the connection. ATM Adaptation Layer (AAL) defines the conversion of user information into ATM cells. AAL1 and AAL2 handle isochronous traffic (such as voice and video), and are relevant to the ATM node only when it is equipped with either a CES (Circuit Emulation Service) ATM interface card, or when it has voice over AAL2 capabilities. AAL3/4 and AAL5 support data communications; that is, they segment and reassemble data packets.

The two types of devices in an ATM network are switches and routers. Typically, ATM switches do packet switching at Layer 2, while ATM routers do packet switching using Layer 3 addresses, such as IPv4 network addresses, IPv6 network addresses, and MPLS labels.

ATM is supported on the following line cards:

- Cisco 1-port Clear Channel OC-3 SPA
- Cisco 3-port Clear Channel OC-3 SPA
- Cisco 1-port Clear Channel OC-12 SPA

Cisco IOS XR software ATM interfaces can operate in the following modes:

- Point-to-point
- Layer 2 port mode

Note A single ATM interface can simultaneously support point-to-point and L2VPN subinterfaces.

In Cisco IOS XR software, ATM interface configuration is hierarchical and comprises the following elements:

1. The ATM main interface, which is the physical interface. ATM main interfaces can be configured with point-to-point subinterfaces, vp-tunnels, ILMI interfaces, or as Layer 2 port mode attachment circuits (ACs) or Layer 2 subinterface ACs.
2. ATM subinterfaces, which are configured under the ATM main interface. An ATM subinterface does not actively carry traffic until you configure a PVC or PVP under the ATM subinterface.
3. PVCs, which are configured under an ATM subinterface. A single PVC is allowed per subinterface. PVCs are supported under point-to-point and Layer 2 subinterfaces.
4. Permanent virtual paths (PVPs), which are configured under a Layer 2 ATM subinterface. A single PVP is allowed per subinterface.

VC-Class Mapping

A virtual circuit (VC) class enables the configuration of VC parameters that are then mapped to a main interface, subinterface, or PVC. Without vc-classes, you must perform considerable manual configuration on each ATM main interface, subinterface, and PVC and on the router. This configuration can be time consuming and error prone. After you have created vc-class, you can apply that vc-class to as many ATM interfaces, subinterfaces, or PVCs as you want.

Vc-classes include the following types of configuration data:

- ATM encapsulation for the VC
- OAM management
- traffic shaping

The order of configuration precedence is hierarchical, as demonstrated in the following list, where configuration on the PVC takes the highest precedence, and configuration on a vc-class that is attached to the ATM main interface takes the lowest precedence:

1. Configuration on the PVC
2. Configuration on a vc-class that is attached to the PVC
3. Configuration on the subinterface
4. Configuration on a vc-class that is attached to the subinterface
5. Configuration on the ATM main interface
6. Configuration on a vc-class that is attached to the ATM main interface

For example, if the a PVC has unspecified bit rate (UBR) traffic shaping configured, but it is attached to a class map that is configure with CBR traffic shaping, the PVC maintains the UBR traffic shaping.

Note Vc-classes are not applicable to Layer 2 port mode ACs and Layer 2 PVPs. For Layer 2 VPN configurations, Vc-classes are applicable to the PVC only.

F5 OAM on ATM Interfaces

The F5 Operation, Administration, and Maintenance (OAM) feature performs fault-management and performance-management functions on PVCs. If the F5 OAM feature is not enabled on a PVC, then that PVC remains up on the end device in the event of a service disruption where network connectivity is lost. The result is that routing entries that point to the connection remain in the routing table and, therefore, packets are lost. The F5 OAM feature detects such failures and brings the PVC down if there is a disruption along its path.

Use the **oam-pvc manage** command to enable the F5OAM feature on a PVC. After OAM is enabled on a PVC, the PVC can generate F5 loopback cells and you can configure continuity check (CC) management for the PVC. Use the **oam ais-rdi** and **oam retry** commands to configure continuity checking on a PVC.

To drop all current and future OAM cells received on an ATM interface, use the **atm oam flush** command in interface configuration mode.

Note The **oam ais-rdi** and **oam retry** commands take effect only after OAM management is enabled on a PVC with the **oam-pvc manage** command.

ILMI on ATM Interfaces

The ILMI protocol is defined by the ATM Forum for setting and capturing physical layer, ATM layer, virtual path, and virtual circuit parameters on ATM interfaces. When two ATM interfaces run the ILMI protocol, they exchange ILMI packets across the physical connection. These packets consist of SNMP messages as large as 484 octets. ATM interfaces encapsulate these messages in an ATM adaptation layer 5 (AAL5) trailer, segment the packet into cells, and schedule the cells for transmission.

You must enable ILMI on ATM interfaces that communicate with end devices that are configured for ILMI. To enable ILMI, create a PVC with ILMI encapsulation directly under the main ATM interface by using the **pvc** *vpi*/*vci* **ilmi** command in interface configuration mode.

PVCs use ILMI encapsulation to carry ILMI messages. Use the **pvc** *vpi*/*vci* **ilmi** command in interface configuration mode to create an ILMI PVC on an ATM main interface.

Note You must use the same VPI and VCI values on both ends of the PVC that connects the end device and the router.

Note The ILMI configuration commands are available only after an ILMI PVC is created under the ATM main interface. The ILMI configuration takes effect on the ATM main interface.

Note ILMI configuration is not supported on Layer 2 port mode ACs.

Layer 2 VPN on ATM Interfaces

The Layer 2 VPN (L2VPN) feature enables the connection between different types of Layer 2 attachment circuits and pseudowires, allowing users to implement different types of end-to-end services.

Cisco IOS XR software supports a point-to-point, end-to-end service, where two ATM ACs are connected together.

Switching can take place in two ways:

- AC-to-PW—Traffic reaching the PE is tunneled over a pseudowire (and conversely, traffic arriving over the PW is sent out over the AC). This is the most common scenario.
- Local switching—Traffic arriving on one AC is immediately sent out another AC without passing through a pseudowire.

Keep the following in mind when configuring L2VPN on an ATM interface:

- Cisco IOS XR software supports up to 2000 ACs per line card.
- ATM-over-MPLS supports two types of cell encapsulation:
  - AAL5 CPCS mode—Unsegmented ATM cells are transported across an MPLS backbone.
  - ATM cell (AAL0) mode—Cells are segmented and then reassembled, or packed. AAL0 is supported on ATM main ports, PVCs, and PVPs. The benefits of using AAL0 mode is that groups of ATM cells share a label that maximizes bandwidth efficiencies.

Note AAL5 mode is supported on PVCs only.

Use the following commands to display AC and pseudowire information:

- **show interfaces**
- **show l2vpn xconnect**
- **show atm pvp**
- **show atm pvc**

Note For detailed information about configuring an L2VPN network, see the *Implementing MPLS Layer 2 VPNs* module of *Cisco IOS XR Multiprotocol Label Switching Configuration Guide.*

Cell Packing on L2VPN ACs with AAL0 Mode Encapsulation

Cell packing is supported on L2VPN ATM interfaces that are configured with AAL0 mode encapsulation. Cell packing relates to the delay variations that are defined in the ATM standards. Users can specify the number of cells that can be processed by the pseudowire, and configure the maximum cell packing timeout (MCPT) timers to use in conjunction with cell packing.

The **cell-packing** command allows the user to perform the following tasks:

- Configure the maximum number of cells that can be transmitted in a single packet
- Attach one of the three MCPT timers to an individual Layer 2 port mode AC, PVC, or PVP.

The three MCPT timers are defined under the main ATM interface with the **atm mcpt-timer** command, which lets the user specify the maximum number of microseconds to wait to complete cell packing on a single packet before that packet is transmitted. If the associated MCPT timer expires before the maximum number of cells that can be packed is reached, then the packet is transmitted with the number of cells that have been packed thus far.

We recommend configuring a low, medium, and high value for the three MCPT timers to accommodate the different ATM traffic classes. Low- latency constant bit rate (CBR) traffic typically uses a low MCPT timer value, while high-latency Unspecified bit rate (UBR) traffic typically requires a high MCPT timer value. Variable bit rate real-time (VBR-rt) and variable bit rate non-real-time (VBR-nrt) traffic typically use a median MCPT timer value.

ATM Layer 2 QoS

QoS is configured on ATM interfaces primarily in the same way that it is configured on other interfaces. No new CLIs are added in this release.

For complete information on configuring QoS and QoS commands, refer to these documents:

- *Cisco IOS XR Modular Quality of Service Configuration Guide for the Cisco CRS Router*
- *Cisco IOS XR Modular Quality of Service Command Reference for the Cisco CRS Router*

This section describes the features and restrictions that apply to ATM Layer 2 QoS.

Features

These QoS features are supported:

- Layer 2 Ingress QoS – policing, marking, and queueing are supported
- Layer 2 Egress Main Interface QoS – shaping, policing, and queueing are supported. Marking is not supported. This feature works on both Layer 2 and Layer 3 PVCs independent of any subinterface QoS policies.
- The Modular QoS CLI (MQC) actions are supported for ATM traffic in the ingress direction only.
  - match atm clp
  - match atm oam
  - set atm clp
  - set mpls exp imp
  - set prec tunnel (L2TPv3 only)
  - set dscp tunnel (L2TPv3 only)
- Traffic is classified based on Cell Loss Priority–CLP1, CLP0, or OAM.
- OAM traffic can be excluded from policing by using the match-oam classification in a hierarchical policy map
- The following set actions are supported:
  - set mpls exp imp
  - set prec tunnel
  - set dscp tunnel
  - set qos-group
  - set disc-class
  - set atm-clp (exceed action only)
- Policy map counters are supported.

Matching

The following match criteria is supported on Layer 2 ATM interfaces in the ingress direction only:

- match atm clp0
- match atm clp1
- match atm oam

The following match criteria is supported on Layer 2 ATM interfaces in the egress direction only:

- match mpls exp topmost (egress only)
- match qos-group (egress only)

Note The **match-all** command does not support the above match criteria.

Marking

The following marking actions are supported on Layer 2 ATM interfaces:

- set mpls exp imposition (AToM only)
- set qos-group (AToM and local switching)
- set discard-class (AToM and local switching)
- set mpls exp imposition and set atm-clp (AToM only)
- set tunnel-dscp (L2TPv3 only)
- set tunnel-prec (L2TPv3 only)

Note Packets can be matched and remarked for CLP0, CLP1, and OAM.

Policing

Policing is supported on Layer 2 ATM interfaces in the ingress direction only.

Policing is performed during segmentation and reassembly (SAR) for the following ATM traffic classes:

- CBR.1
- VBR.1
- VBR.2
- VBR.3
- UBR.1
- UBR.2

Policing is supported for VC and VP modes, but not for Port mode L2 ATM interfaces.

OAM cells are policed along with the user cells unless the QOS policy is explicitly configured to exclude OAM cells from being policed. This can be achieved using different match criteria in the policy map with class-default matching all the traffic including OAM cells.

Policing is supported for ATM AAL5SNAP, AAL5MUX and AAL5NLPID encapsulated packets.

Policing is done on AAL0 packets with the same conditions as AAL5 packets as follows:

- AAL5 packet is conforming if all the cells in the packet conform to PCR and SCR buckets.
- AAL5 packet is exceeding if at least one cell does not conform to the SCR bucket.
- AAL5 packet is violating if at least one cell does not conform to the PCR bucket.

Note The Martini Control Word C bit is set for all exceeding AAL5 packets. All violating AAL5 packets are dropped.

The following policing options are supported for ATM TM4.0 GCRA policing:

- Rate in cellsps and percent
- Peak rate in cellsps and percent
- Delay tolerance in us
- Maximum burst size in cells

The following conform and exceed actions are supported for Layer 2 ATM interfaces in the ingress direction:

- transmit
- drop
- set mpls exp imposition (AToM only)
- set qos-group (AToM and Local switching)
- set discard-class (AToM and Local switching)
- set atm-clp (exceed action only, AToM and Local switching)
- set tunnel-prec (L2TPv3 only)
- set tunnel-dscp (L2TPv3 only)

Note The only violate action that is supported is the drop action.

The following combination of multiple policing actions is supported:

- set mpls exp imposition and set atm-clp (exceed action only, AToM only)

Hierarchical Policy Maps

For VBR.2 and VBR.3 traffic classes, 2-level hierarchical policy maps are supported in the ingress direction only. Attempts to attach hierarchical policy maps in the egress direction are denied.

The parent policy contains the policing configuration for the PCR bucket and matches on all traffic. The parent policy may exclude OAM traffic.

The child policy contains the policing configuration for the SCR bucket and typically matches on CLP0 cells.

Marking actions are supported only in child policy maps. All other policing actions are allowed in parent policy maps.

Only two policing buckets per Layer 2 circuit are allowed; one in the parent policy that defines the peak rate, and one in the child policy that defines the SCR.

Typically CLP0 cells are sent to the SCR bucket, but it is possible to send both CLP0 and CLP1 cells to the SCR bucket, using the classification criteria in the child policy.

Note For ATM Layer 2 QoS, in policy maps, the **set atm-clp** command is supported only as a police exceed action. It is not supported as a standalone set action.

Configuring ATM Interfaces

The ATM interface configuration tasks are described in the following procedures:

Bringing Up an ATM Interface

This task describes the commands used to bring up an ATM interface.

Restrictions

The configuration on both ends of the ATM connection must match for the interface to be active.

SUMMARY STEPS

1. **configure**
2. **interface atm** *interface-path-id*
3. **no shutdown**
4. **end**
   or
   commit

5. **exit**
6. **exit**
7. Repeat Step 1 through Step 6 to bring up the interface at the other end of the connection.
8. **show interfaces atm** *interface-path-id* **brief**

DETAILED STEPSs

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id* **Example:** `RP/0/RP0/CPU0:router (config)# interface atm 0/6/0/1`	Enters ATM interface configuration mode.
Step 3	**no shutdown** **Example:** `RP/0/RP0/CPU0:router (config-if)# no shutdown`	Removes the shutdown configuration. **Note** Removal of the shutdown configuration eliminates the forced administrative down on the interface, enabling it to move to an up or down state.

Step 4	**end**
	or
	commit
	
	Example:
	`RP/0/RP0/CPU0:router (config-if)# end`
	or
	`RP/0/RP0/CPU0:router(config-if)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:`
		– Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		– Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		– Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Step 5	**exit** **Example:** `RP/0/RP0/CPU0:router (config-if)# exit`	Exits interface configuration mode and enters global configuration mode.

	Command or Action	Purpose
Step 6	**exit** **Example:** `RP/0/RP0/CPU0:router (config)# exit`	Exits global configuration mode and enters EXEC mode.
Step 7	Repeat Step 1 through Step 6 to bring up the interface at the other end of the connection.	Brings up the connection. **Note** The configuration on both ends of the ATM connection must match.
Step 8	**show interfaces atm** *interface-path-id* **brief** **Example:** `RP/0/RP0/CPU0:router# show interfaces atm 0/6/0/1 brief`	(Optional) Verifies that the interface is active and properly configured. If you have brought up an ATM interface properly, the "Intf State" field for that interface in the **show interfaces atm** command output shows "up."

What to Do Next

- To modify the default configuration of the ATM interface you just brought up, see the "Configuring Optional ATM Interface Parameters" section on page 20.
- To configure a point-to-point subinterface on the ATM interface you just brought up, see the "How to Create and Configure a Point-to-Point ATM Subinterface with a PVC" section on page 23.
- To create a vp-tunnel on the ATM interface you just brought up, see the "How to Configure a Layer 2 Attachment Circuit" section on page 28.
- To use the interface as a Layer 2 post mode AC, see the "How to Configure a Layer 2 Attachment Circuit" section on page 28.
- To attach a Vc-class to the ATM interface you just brought up, see the "How to Create and Configure a VC-Class" section on page 39.
- To enable ILMI on the ATM interface you just brought up, see the "How to Configure ILMI on ATM Interfaces" section on page 47.

Configuring Optional ATM Interface Parameters

This task describes the commands you can use to modify the default configuration on an ATM interface.

Prerequisites

Before you modify the default ATM interface configuration, we recommend that you bring up the ATM interface and remove the shutdown configuration, as described in the "Bringing Up an ATM Interface" section on page 18.

Restrictions

The configuration on both ends of the ATM connection must match for the interface to be active.

SUMMARY STEPS

1. **configure**
2. **interface atm** *interface-path-id*
3. **atm maxvpi-bits 12**
4. **atm oam flush**
5. **atm mcpt-timers** *timer-1 timer-2 timer-3*
6. **end**
   or
   commit
7. **exit**
8. **exit**
9. **show atm interface atm** [*interface-path-id*]
10. **show interfaces atm** *interface-path-id* **brief**

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id* **Example:** `RP/0/RP0/CPU0:router (config)# interface atm 0/6/0/1`	Enters ATM interface configuration mode.
Step 3	**atm maxvpi-bits 12** **Example:** `RP/0/RP0/CPU0:router (config-if)# atm maxvpi-bits 12`	(Optional) Enables support for the 12-bit VPI NNI cell format.
Step 4	**atm oam flush** **Example:** `RP/0/RP0/CPU0:router (config-if)# atm oam flush`	(Optional) Drops all current and future OAM cells received on an ATM interface.
Step 5	**atm mcpt-timers** *timer-1 timer-2 timer-3* **Example:** `RP/0/RP0/CPU0:router (config-if)# atm mcpt-timers 50 100 200`	(Optional) Specifies the maximum cell packing timeout values for each of the three per-interface MCPT timers, in microseconds. **Note** The default value for each timer is 50 microseconds. **Note** The **atm mcpt-timers** command is applicable to Layer 2 ATM ACs only.

	Command or Action	Purpose

Step 6	**end**
	or
	commit
	
	Example:
	`RP/0/RP0/CPU0:router (config-if)# end`
	or
	`RP/0/RP0/CPU0:router(config-if)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:`
		– Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		– Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		– Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Step 7	**exit** **Example:** `RP/0/RP0/CPU0:router (config-if)# exit`	Exits interface configuration mode and enters global configuration mode.
Step 8	**exit** **Example:** `RP/0/RP0/CPU0:router (config)# exit`	Exits global configuration mode and enters EXEC mode.
Step 9	**show atm interface atm** [*interface-path-id*] **Example:** `RP/0/RP0/CPU0:router# show atm interface atm 0/6/0/1`	(Optional) Displays ATM-specific data for the specified ATM interface.
Step 10	**show interfaces atm** *interface-path-id* **Example:** `RP/0/RP0/CPU0:router# show interfaces atm 0/6/0/1`	(Optional) Displays general information for the specified ATM interface.

What to Do Next

- To configure a point-to-point subinterface on the ATM interface you just brought up, see the "How to Create and Configure a Point-to-Point ATM Subinterface with a PVC" section on page 23.
- To create a vp-tunnel on the ATM interface you just brought up, see the "How to Configure a Layer 2 Attachment Circuit" section on page 28.
- To use the interface as a Layer 2 ATM AC, see the "How to Configure a Layer 2 Attachment Circuit" section on page 28.

- To attach a Vc-class to the ATM interface you just brought up, see the "How to Create and Configure a VC-Class" section on page 39.
- To enable ILMI on the ATM interface you just brought up, see the "How to Configure ILMI on ATM Interfaces" section on page 47.

How to Create and Configure a Point-to-Point ATM Subinterface with a PVC

The configuration tasks for creating and configuring a point-to-point ATM subinterface with a PVC are described in the following procedures:

- Creating a Point-to-Point ATM Subinterface with a PVC, page 23
- Configuring Optional Point-to-Point ATM PVC Parameters, page 25

Creating a Point-to-Point ATM Subinterface with a PVC

The procedure in this section creates a point-to-point ATM subinterface and configures a permanent virtual circuit (PVC) on that ATM subinterface.

Prerequisites

Before you can create an ATM subinterface on an ATM interface, you must bring up an ATM interface, as described in the "Bringing Up an ATM Interface" section on page 18.

Restrictions

Only one PVC can be configured for each point-to-point ATM subinterface.

SUMMARY STEPS

1. **configure**
2. **interface atm** *interface-path-id.subinterface* **point-to-point**
3. **ipv4 address** *ipv4_address/prefix*
4. **pvc** *vpi/vci*
5. **end**
   or
   commit
6. Repeat Step 1 through Step 5 to bring up the ATM subinterface and any associated PVC at the other end of the connection.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id.subinterface* **point-to-point** **Example:** `RP/0/RP0/CPU0:router (config)# interface atm 0/6/0/1.10`	Enters ATM subinterface configuration mode.
Step 3	**ipv4 address** *ipv4_address/prefix* **Example:** `RP/0/RP0/CPU0:router (config-subif)#ipv4 address 10.46.8.6/24`	Assigns an IP address and subnet mask to the subinterface.
Step 4	**pvc** *vpi/vci* **Example:** `RP/0/RP0/CPU0:router (config-subif)# pvc 5/10`	(Optional) Creates an ATM permanent virtual circuit (PVC) and enters ATM PVC configuration submode. **Note** Only one PVC is allowed per subinterface.

Step 5	**end**
	or
	commit
	
	Example:
	`RP/0/RP0/CPU0:router (config-subif)# end`
	or
	`RP/0/RP0/CPU0:router(config-subif)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:`
		– Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		– Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		– Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Step 6	Repeat Step 1 through Step 5 to bring up the ATM subinterface and any associated PVC at the other end of the connection.	Brings up the ATM connection. **Note** The configuration on both ends of the subinterface connection must match.

What to Do Next

- To configure optional PVC parameters, see the "Configuring Optional Point-to-Point ATM PVC Parameters" section on page 25.
- To attach Layer 3 service policies, such as Multiprotocol Label Switching (MPLS) or quality of service (QoS), to the PVC under the PVC submode, refer to the appropriate Cisco IOS XR software configuration guide.
- To configure a vc-class and apply it to an ATM subinterface or PVC, see the "Creating and Configuring a VC-Class" section on page 40.

Configuring Optional Point-to-Point ATM PVC Parameters

This task describes the commands you can use to modify the default configuration on an ATM PVC.

Prerequisites

Before you can modify the default PVC configuration, you must create the PVC on an ATM subinterface, as described in the "Creating a Point-to-Point ATM Subinterface with a PVC" section on page 23.

Restrictions

The configuration on both ends of the PVC must match for the connection to be active.

SUMMARY STEPS

1. **configure**
2. **interface atm** *interface-path-id.subinterface* **point-to-point**
3. **pvc** *vpi/vci*
4. **encapsulation** {**aal5mux ipv4 | aal5nlpid | aal5snap**}
5. **oam-pvc manage** [*frequency*] [**disable**] [**keep-vc-up** [**seg-aisrdi-failure**]]
6. **oam ais-rdi** [*down-count* [*up-count*]]
7. **oam retry**
8. **shape** [**cbr** *peak_output_rate* | **ubr** *peak_output_rate* | **vbr-nrt** *peak_output_rate sustained_output_rate burst_size*| **vbr-rt** *peak_output_rate sustained_output_rate burst_size*]
9. **service-policy** [**input** | **output**] *policy_name*
10. **end**
    or
    commit
11. Repeat Step 1 through Step 10 to configure the PVC at the other end of the connection.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id.subinterface* **point-to-point** **Example:** `RP/0/RP0/CPU0:router (config)# interface atm 0/6/0/1.10 point-to-point`	Enters ATM subinterface configuration mode.
Step 3	**pvc** *vpi/vci* **Example:** `RP/0/RP0/CPU0:router (config-subif)# pvc 5/10`	Enters subinterface configuration mode for the PVC.
Step 4	**encapsulation** {**aal5mux ipv4** | **aal5nlpid** | **aal5snap**} **Example:** `RP/0/RP0/CPU0:router (config-atm-vc)# encapsulation aal5snap`	Configures the ATM adaptation layer (AAL) and encapsulation type for a PVC. **Note** The default encapsulation type for a vc-class is AAL5/SNAP
Step 5	**oam-pvc manage** [*frequency*] [**disable**] [**keep-vc-up** [**seg-aisrdi-failure**] **Example:** `RP/0/RP0/CPU0:router (config-atm-vc)# oam-pvc manage 200 keep-vc-up`	Enable ATM OAM F5 loopback cell generation and configures continuity check (CC) management for the ATM permanent virtual circuit (PVC). • Include the **disable** keyword to disable OAM management on the specified PVC. • Include the **keep-vc-up** keyword specify that PVC remains in the UP state when CC cells detect connectivity failure. • Include the **seg-aisrdi-failure** keyword to specify that, if segment AIS/RDI cells are received, the VC will not be brought down because of end CC failure or loopback failure.
Step 6	**oam ais-rdi** [*down-count* [*up-count*]] **Example:** `RP/0/RP0/CPU0:router (config-atm-vc)# oam ais-rdi 25 5`	Configures the PVC so that it is brought down after a specified number of OAM alarm indication signal/remote defect indication (AIS/RDI) cells are received on the associated PVC.
Step 7	**oam retry** [*up-count* [*down-count* [*retry-frequency*]]] **Example:** `RP/0/RP0/CPU0:router (config-atm-vc)# oam retry 5 10 5`	Configures parameters related to OAM management for the PVC. If no OAM AIS/RDI cells are received within the specified interval, the PVC is brought up.

	Command or Action	Purpose
Step 8	**shape** [**cbr** *peak_output_rate* | **ubr** *peak_output_rate*| **vbr-nrt** *peak_output_rate sustained_output_rate burst_size*| **vbr-rt** *peak_output_rate sustained_output_rate burst_size*] **Example:** `RP/0/RP0/CPU0:router (config-atm-vc)# shape vbr-nrt 100000 100000 8000`	Configures ATM traffic shaping for the PVC. You must estimate how much bandwidth is required before you configure ATM traffic shaping. • *peak_output_rate*—Configures the maximum cell rate that is always available for the traffic. • *Sustained_output_rate*—Sustained output rate for the bit rate. • *burst size*—Burst cell size for the bit rate. Range is from 1 through 8192.
Step 9	**service-policy** [**input** | **output**] *policy_name* **Example:** `RP/0/RP0/CPU0:router (config-atm-vc)# service-policy input policyA`	Attaches a QoS policy to an input or output PVC. Replace *policy_name* with the name of the service policy you want to attach to the PVC. **Note** For information on creating and configuring service policies, see the *Cisco IOS XR Modular Quality of Service Configuration Guide.*

Step 10	**end**
	or
	commit
	
	Example:
	`RP/0/RP0/CPU0:router (config-subif)# end`
	or
	`RP/0/RP0/CPU0:router(config-subif)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:`
		– Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		– Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		– Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Step 11	Repeat Step 1 through Step 10 to configure the PVC at the other end of the connection.	Brings up the connection. **Note** The configuration on both ends of the connection must match.

What to Do Next

- To attach Layer 3 service policies, such as MPLS or QoS, to the PVC under the PVC submode, refer to the appropriate Cisco IOS XR software configuration guide.
- To configure a vc-class and apply it to an ATM subinterface or PVC, see the "Creating and Configuring a VC-Class" section on page 40.

How to Configure a Layer 2 Attachment Circuit

The Layer 2 AC configuration tasks are described in the following procedures:

- Creating a Layer 2 Port Mode AC
- Configuring Optional Parameters on a Layer 2 Port Mode AC
- Creating an ATM Layer 2 Subinterface with a PVC
- Configuring Optional ATM Layer 2 PVC Parameters
- Creating an ATM Layer 2 Subinterface with a PVP
- Configuring Optional ATM Layer 2 PVP Parameters

Note After you configure an interface for Layer 2 switching, no routing commands such as **ipv4 address** are permissible. If any routing commands are configured on the interface, then the **l2transport** command is rejected.

Creating a Layer 2 Port Mode AC

The procedure in this section creates a Layer 2 port mode AC.

Prerequisites

Before you can create a Layer 2 port mode AC, you must bring up an ATM main interface, as described in the "Bringing Up an ATM Interface" section on page 18.

Restrictions

ILMI configuration is not supported on Layer 2 port mode ACs.

Restrictions

Before you can configure an Layer 2 port mode AC, you must ensure that no configuration, such as subinterfaces, already exists on that port. If any preconfiguration does exist, you must remove it.

SUMMARY STEPS

1. **configure**
2. **interface atm** *interface-path-id*
3. **l2transport**
4. **end**
   or
   commit
5. Repeat Step 1 through Step 4 to bring up the ATM AC at the other end of the connection.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id* **Example:** `RP/0/RP0/CPU0:router (config)# interface atm 0/6/0/1`	Enters interface configuration mode for an ATM interface.
Step 3	**l2transport** **Example:** `RP/0/RP0/CPU0:router (config-if)# l2transport`	Enters ATM Layer 2 transport configuration mode, and enables Layer 2 port mode on this ATM interface.

Step 4	**end**
	or
	commit
	
	Example:
	`RP/0/RP0/CPU0:router (config-if-l2)# end`
	or
	`RP/0/RP0/CPU0:router(config-if-l2)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:`
		– Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		– Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		– Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Step 5	Repeat Step 1 through Step 4 to bring up the Layer 2 port mode AC at the other end of the connection.	Brings up the Layer 2 port mode AC. **Note** The configuration on both ends of the connection must match.

What to Do Next

- To configure a point-to-point pseudowire XConnect on the Layer 2 port mode AC you just created, see the *Implementing MPLS Layer 2 VPNs* module of *Cisco IOS XR Multiprotocol Label Switching Configuration Guide*.
- To configure optional Layer 2 VPN parameters for the ATM AC, see the "Configuring Optional Parameters on a Layer 2 Port Mode AC" section on page 30.

Configuring Optional Parameters on a Layer 2 Port Mode AC

The procedure in this section configures optional Layer 2 VPN transport parameters on a Layer 2 port mode AC.

Prerequisites

Before you can configure Layer 2 VPN parameters on a Layer 2 port mode AC, you must create a Layer 2 port mode AC, as described in the "Creating a Layer 2 Port Mode AC" section on page 28.

SUMMARY STEPS

1. **configure**
2. **interface atm** *interface-path-id*
3. **atm mcpt-timers** *timer-1 timer-2 timer-3*
4. **l2transport**
5. **cell-packing** *cells timer*
6. **end**
   or
   commit
7. Repeat Step 1 through Step 6 to configure the Layer 2 port mode AC at the other end of the connection.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id* **Example:** `RP/0/RP0/CPU0:router (config)# interface atm 0/6/0/1`	Enters interface configuration mode for an ATM interface.
Step 3	**atm mcpt-timers** *timer-1 timer-2 timer-3* **Example:** `RP/0/RP0/CPU0:router (config-if)# atm mcpt-timers 50 100 200`	Specifies the maximum cell packing timeout values for each of the three per-interface MCPT timers, in microseconds. **Note** The default value for each timer is 50 microseconds.
Step 4	**l2transport** **Example:** `RP/0/RP0/CPU0:router (config-if)# l2transport`	Enters ATM Layer 2 transport configuration mode.

	Command or Action	Purpose
Step 5	**cell-packing** *cells timer* **Example:** `RP/0/RP0/CPU0:router (config-if-l2)# cell-packing 6 1`	Sets the maximum number of cells allowed per packet, and specifies a maximum cell packing timeout (MCPT) timer to use for cell packing. • Replace *cells* with the maximum number of cells to use per packet. Range is from 2 through 86. • Replace *timer* with the number that indicates the appropriate MCPT timer to use for cell packing. Can be **1**, **2**, or **3**. You can configure up to three different MCPT values for a single main interface.

Step 6	**end**
	or
	commit
	
	Example:
	`RP/0/RP0/CPU0:router (config-if-l2)# end`
	or
	`RP/0/RP0/CPU0:router(config-if-l2)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:`
		– Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		– Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		– Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Step 7	Repeat Step 1 through Step 6 to configure the AC at the other end of the connection.	Brings up the Layer 2 port mode AC. **Note** The configuration on both ends of the connection must match.

Creating an ATM Layer 2 Subinterface with a PVC

The procedure in this section creates a Layer 2 subinterface with a PVC.

Prerequisites

Before you can create a subinterface on an ATM interface, you must bring up an ATM interface, as described in the "Bringing Up an ATM Interface" section on page 18.

Restrictions

Only one PVC can be configured for each ATM subinterface.

SUMMARY STEPS

1. **configure**
2. **interface atm** *interface-path-id.subinterface* **l2transport**
3. **pvc** *vpi/vci*
4. **end**
   or
   commit
5. Repeat Step 1 through Step 4 to bring up the ATM subinterface and any associated PVC at the other end of the AC.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id.subinterface* **l2transport** **Example:** `RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/1.10 l2transport`	Creates a subinterface and enters ATM subinterface configuration mode for that subinterface.
Step 3	**pvc** *vpi/vci* **Example:** `RP/0/RP0/CPU0:router(config-if)# pvc 5/20`	Creates an ATM permanent virtual circuit (PVC) and enters ATM Layer 2 transport PVC configuration mode. **Note** Only one PVC is allowed per subinterface.

	Command or Action	Purpose

Step 4	**end**
	or
	commit
	
	Example:
	`RP/0/RP0/CPU0:router(config-atm-l2transport-pvc)# end`
	or
	`RP/0/RP0/CPU0:router(config-atm-l2transport-pvc)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:`
		– Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		– Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		– Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Step 5	Repeat Step 1 through Step 4 to bring up the ATM subinterface and any associated PVC at the other end of the AC.	Brings up the AC. **Note** The configuration on both ends of the AC must match.

What to Do Next

- To configure optional PVC parameters, see the "Configuring Optional ATM Layer 2 PVC Parameters" section on page 33.
- To configure a vc-class and apply it to the PVC, see the"Attaching a VC-Class to a PVC on an ATM Subinterface" section on page 45.
- To configure a point-to-point pseudowire XConnect on the AC you just created, see the *Implementing MPLS Layer 2 VPNs* module of *Cisco IOS XR Multiprotocol Label Switching Configuration Guide*.

Configuring Optional ATM Layer 2 PVC Parameters

This task describes the commands you can use to modify the default configuration on an ATM Layer 2 PVC.

Prerequisites

Before you can modify the default PVC configuration, you must create the PVC on a Layer 2 ATM subinterface, as described in the "Creating an ATM Layer 2 Subinterface with a PVC" section on page 31.

Restrictions

The configuration on both ends of the PVC must match for the connection to be active.

SUMMARY STEPS

1. **configure**
2. **interface atm** *interface-path-id.subinterface* **l2transport**
3. **pvc** *vpi/vci*
4. **encapsulation** {**aal0 | aal5**}
5. **cell-packing** *cells timer*
6. **shape** [**cbr** *peak_output_rate* | **ubr** *peak_output_rate* | **vbr-nrt** *peak_output_rate sustained_output_rate burst_size*| **vbr-rt** *peak_output_rate sustained_output_rate burst_size*]
7. **end**
   or
   commit
8. Repeat Step 1 through Step 7 to configure the PVC at the other end of the AC.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id.subinterface* **l2transport** **Example:** `RP/0/RP0/CPU0:router(config-if)# interface atm 0/6/0/1.10 l2transport`	Enters ATM subinterface configuration mode for a Layer 2 ATM subinterface.
Step 3	**pvc** *vpi/vci* **Example:** `RP/0/RP0/CPU0:router(config-atm-l2transport-pvc)# pvc 5/20`	Enters ATM Layer 2 transport PVC configuration mode for the specified PVC.
Step 4	**encapsulation** {**aal0** | **aal5**} **Example:** `RP/0/RP0/CPU0:router(config-atm-l2transport-pvc)# encapsulation aal5`	Configures the ATM adaptation layer (AAL) and encapsulation type for a PVC. **Note** The default encapsulation type for a PVC is AAL5.

	Command or Action	Purpose
Step 5	**cell-packing** *cells timer* **Example:** `RP/0/RP0/CPU0:router(config-atm-l2transport-pvc )# cell-packing 5 2`	Sets the maximum number of cells allowed per packet, and specifies a maximum cell packing timeout (MCPT) timer to use for cell packing. • Replace *cells* with the maximum number of cells to use per packet. Range is from 2 through 86. • Replace *timer* with the number that indicates the appropriate MCPT timer to use for cell packing. Can be **1**, **2**, or **3**. You can configure up to three different MCPT values for a single main interface.
Step 6	**shape** [**cbr** *peak_output_rate* | **ubr** *peak_output_rate*| **vbr-nrt** *peak_output_rate sustained_output_rate burst_size*| **vbr-rt** *peak_output_rate sustained_output_rate burst_size*] **Example:** `RP/0/RP0/CPU0:router(config-atm-l2transport-pvc )# shape vbr-nrt 100000 100000 8000`	Configures ATM traffic shaping for the PVC. You must estimate how much bandwidth is required before you configure ATM traffic shaping. • *peak_output_rate*—Configures the maximum cell rate that is always available for the traffic. • *Sustained_output_rate*—Sustained output rate for the bit rate. • *burst size*—Burst cell size for the bit rate. Range is from 1 through 8192.

Step 7	**end**
	or
	commit
	
	Example:
	`RP/0/RP0/CPU0:router(config-atm-l2transport-pvc )# end`
	or
	`RP/0/RP0/CPU0:router(config-atm-l2transport-pvc )# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:`
		– Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		– Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		– Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Step 8	Repeat Step 1 through Step 7 to configure the PVC at the other end of the AC.	Brings up the AC. **Note** The configuration on both ends of the connection must match.

What to Do Next

- To configure a pseudo-wire XConnect on the AC you just created, see the *Implementing MPLS Layer 2 VPNs* module of *Cisco IOS XR Multiprotocol Label Switching Configuration Guide*.
- To configure a vc-class and apply it to the PVC, see the"Attaching a VC-Class to a PVC on an ATM Subinterface" section on page 45.

Creating an ATM Layer 2 Subinterface with a PVP

The procedure in this section creates an ATM Layer 2 subinterface with a permanent virtual path (PVP) on that ATM subinterface.

Prerequisites

Before you can create a subinterface with a PVP on an ATM interface, you must bring up an ATM interface, as described in the "Bringing Up an ATM Interface" section on page 18.

Restrictions

- Only one PVP can be configured for each L2VPN ATM AC.
- F4 OAM emulation is not supported on Layer 2 PVPs.

SUMMARY STEPS

1. **configure**
2. **interface atm** *interface-path-id.subinterface* **l2transport**
3. **pvp** *vpi*
4. **end**
   or
   commit
5. Repeat Step 1 through Step 4 to bring up the ATM subinterface and any associated PVP at the other end of the AC.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id.subinterface* **l2transport** **Example:** `RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/1.10 l2transport`	Creates an ATM subinterface and enters ATM layer2 transport configuration mode for that subinterface.

	Command or Action	Purpose
Step 3	**pvp** *vpi* **Example:** `RP/0/RP0/CPU0:router(config-if)# pvp 100`	(Optional) Creates an ATM PVP and enters ATM PVP configuration submode. **Note** Only one PVP is allowed per subinterface.

Step 4	**end**
	or
	commit
	
	Example:
	`RP/0/RP0/CPU0:router(config-atm-l2transport-pvp)# end`
	or
	`RP/0/RP0/CPU0:router(config-atm-l2transport-pvp)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:`
		– Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		– Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		– Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Step 5	Repeat Step 1 through Step 4 to bring up the ATM subinterface and any associated PVP at the other end of the AC.	Brings up the ATM AC. **Note** The configuration on both ends of the AC connection must match.

What to Do Next

- To configure optional PVP parameters, see the "Configuring Optional ATM Layer 2 PVP Parameters" section on page 37.
- To configure a point-to-point pseudowire XConnect on the AC you just created, see the *Implementing MPLS Layer 2 VPNs* module of *Cisco IOS XR Multiprotocol Label Switching Configuration Guide*.

Configuring Optional ATM Layer 2 PVP Parameters

This task describes the commands you can use to modify the default configuration on an ATM Layer 2 PVP.

Prerequisites

Before you can modify the default PVP configuration, you must create the PVP on an ATM subinterface, as described in the "Creating an ATM Layer 2 Subinterface with a PVP" section on page 36.

SUMMARY STEPS

1. **configure**
2. **interface atm** *interface-path-id.subinterface* **l2transport**
3. **pvp** *vpi*
4. **cell-packing** *cells timer*
5. **shape** [**cbr** *peak_output_rate* | **ubr** *peak_output_rate* | **vbr-nrt** *peak_output_rate sustained_output_rate burst_size*| **vbr-rt** *peak_output_rate sustained_output_rate burst_size*]
6. **end**
   or
   commit
7. Repeat Step 1 through Step 6 to configure the PVP at the other end of the connection.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id.subinterface* **l2transport** **Example:** `RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/1.10 l2transport`	Enters ATM subinterface configuration mode.
Step 3	**pvp** *vpi* **Example:** `RP/0/RP0/CPU0:router(config-if)# pvp 10`	Enters subinterface configuration mode for the PVP.
Step 4	**cell-packing** *cells timer* **Example:** `RP/0/RP0/CPU0:router(config-atm-l2transport-pvp)# cell-packing 5 2`	Sets the maximum number of cells allowed per packet, and specifies a maximum cell packing timeout (MCPT) timer to use for cell packing. • Replace *cells* with the maximum number of cells to use per packet. Range is from 2 through 86. • Replace *timer* with the number that indicates the appropriate MCPT timer to use for cell packing. Can be **1**, **2**, or **3**. You can configure up to three different MCPT values for a single main interface.

	Command or Action	Purpose
Step 5	**shape** [**cbr** *peak_output_rate* | **ubr** *peak_output_rate*| **vbr-nrt** *peak_output_rate sustained_output_rate burst_size*| **vbr-rt** *peak_output_rate sustained_output_rate burst_size*] **Example:** `RP/0/RP0/CPU0:router(config-atm-l2transport-pvp )# shape vbr-nrt 100000 100000 8000`	Configures ATM traffic shaping for the PVC. You must estimate how much bandwidth is required before you configure ATM traffic shaping. • *peak_output_rate*—Configures the maximum cell rate that is always available for the traffic. • *Sustained_output_rate*—Sustained output rate for the bit rate. • *burst size*—Burst cell size for the bit rate. Range is from 1 through 8192.

Step 6	**end**
	or
	commit
	
	Example:
	`RP/0/RP0/CPU0:router(config-atm-l2transport-pvp )# end`
	or
	`RP/0/RP0/CPU0:router(config-atm-l2transport-pvp )# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:`
		– Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		– Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		– Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Step 7	Repeat Step 1 through Step 6 to configure the PVP at the other end of the AC.	Brings up the AC. **Note** The configuration on both ends of the AC connection must match.

What to Do Next

- To configure a point-to-point pseudowire XConnect on the AC you just created, see the *Implementing MPLS Layer 2 VPNs* module of *Cisco IOS XR Multiprotocol Label Switching Configuration Guide*.

How to Create and Configure a VC-Class

The configuration tasks for creating and configuring an ATM VC-Class are described in the following procedures:

- Creating and Configuring a VC-Class, page 40
- Attaching a VC-Class to a Point-to-Point ATM Main Interface, page 43

Creating and Configuring a VC-Class

This section describes the tasks and commands required to create a virtual circuit (VC) class and attach it to an ATM main interface, subinterface, or permanent virtual circuit (PVC).

Restrictions

For Layer 2 VPN AC configurations, VC-classes can be applied to PVCs only. VC-classes are not supported on Layer 2 port mode interfaces or PVPs.

SUMMARY STEPS

1. **configure**
2. **vc-class atm** *name*
3. **encapsulation** {**aal5mux ipv4 | aal5nlpid | aal5snap**}
4. **oam ais-rdi** [*down-count* [*up-count*]]
5. **oam retry** [*up-count* [*down-count* [*retry-frequency*]]]
6. **oam-pvc manage** *seconds*
7. **shape** [**cbr** *peak_output_rate* | **ubr** *peak_output_rate* | **vbr-nrt** *peak_output_rate sustained_output_rate burst_size*| **vbr-rt** *peak_output_rate sustained_output_rate burst_size*]
8. **end**
   or
   commit

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**vc-class atm name** **Example:** `RP/0/RP0/CPU0:router (config)# vc-class atm class1`	Creates a vc-class for an ATM interface and enters vc-class configuration mode.

	Command or Action	Purpose
Step 3	**encapsulation** {**aal5mux ipv4** | **aal5nlpid** | **aal5snap**} **Example:** `RP/0/RP0/CPU0:router (config-vc-class-atm)# encapsulation aal5snap`	Configures the ATM adaptation layer (AAL) and encapsulation type for an ATM vc-class. **Note** The default encapsulation type for a vc-class is AAL5/SNAP **Note** In Vc-classes, the **encapsulation** command applies to Layer 3 Point-to-point configurations only.
Step 4	**oam ais-rdi** [*down-count* [*up-count*]] **Example:** `RP/0/RP0/CPU0:router (config-vc-class-atm)# oam ais-rdi 25 5`	Configures the vc-class so that it is brought down after a specified number of OAM alarm indication signal/remote defect indication (AIS/RDI) cells are received on the associated PVC. **Note** In vc-classes, the **oam ais-rdi** command applies to Layer 3 Point-to-point configurations only.
Step 5	**oam retry** [*up-count* [*down-count* [*retry-frequency*]]] **Example:** `RP/0/RP0/CPU0:router (config-vc-class-atm)# oam retry 5 10 5`	Configures parameters related to OAM management. **Note** In vc-classes, the **oam retry** command applies to Layer 3 Point-to-point configurations only.
Step 6	**oam-pvc manage** *seconds* **Example:** `RP/0/RP0/CPU0:router (config-vc-class-atm)# oam-pvc manage 300`	Configures the ATM OAM F5 loopback frequency. **Note** In vc-classes, the **oam-pvc manage** command applies to Layer 3 Point-to-point configurations only.

	Command or Action	Purpose
Step 7	**shape** [**cbr** *peak_output_rate* | **ubr** *peak_output_rate* | **vbr-nrt** *peak_output_rate sustained_output_rate burst_size*| **vbr-rt** *peak_output_rate sustained_output_rate burst_size*] **Example:** `RP/0/RP0/CPU0:router (config-vc-class-atm)# shape vbr-nrt 100000 100000 8000`	Configures ATM traffic shaping for the PVC. You must estimate how much bandwidth is required before you configure ATM traffic shaping. • *peak_output_rate*—Configures the maximum cell rate that is always available for the traffic. • *Sustained_output_rate*—Sustained output rate for the bit rate. • *burst size*—Burst cell size for the bit rate. Range is from 1 through 8192.

Step 8	**end**
	or
	commit
	
	Example:
	`RP/0/RP0/CPU0:router (config-if)# end`
	or
	`RP/0/RP0/CPU0:router(config-if)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:`
		– Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		– Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		– Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

What to Do Next

Attach the vc-class to an ATM main interface, subinterface, or PVC.

- To attach a vc-class to an ATM main interface, see the "Attaching a VC-Class to a Point-to-Point ATM Main Interface" section on page -43.
- To attach a vc-class to an ATM subinterface, see the "Attaching a VC-Class to a Point-to-Point ATM Subinterface" section on page -44.
- To attach a vc-class to an ATM PVC, see the "Attaching a VC-Class to a PVC on an ATM Subinterface" section on page -45.

Attaching a VC-Class to a Point-to-Point ATM Main Interface

This section describes the tasks and commands required to attach a vc-class to a point-to-point ATM main interface.

Restrictions

VC-classes are not applicable to Layer 2 port mode ACs. For Layer 2 VPN configurations, Vc-classes are applicable to the PVC only.

SUMMARY STEPS

1. **configure**
2. **interface atm** *interface-path-id* **point-to-point**
3. **class-int** *vc-class-name*
4. **end**
   or
   commit

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id* **point-to-point** **Example:** `RP/0/RP0/CPU0:router (config)# interface atm 0/6/0/1 point-to-point`	Enters ATM interface configuration mode.

	Command or Action	Purpose
Step 3	**class-int** *vc-class-name* **Example:** `RP/0/RP0/CPU0:router (config-if)# class-int classA`	Attaches the vc-class to an ATM main interface. Replace the *vc-class-name* argument with the name of the vc-class you configured in the "Creating and Configuring a VC-Class" section on page 40.

Step 4	**end**
	or
	commit
	
	Example:
	`RP/0/RP0/CPU0:router (config-if)# end`
	or
	`RP/0/RP0/CPU0:router(config-if)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:`
		– Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		– Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		– Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Attaching a VC-Class to a Point-to-Point ATM Subinterface

This section describes the tasks and commands required to attach a vc-class to an ATM subinterface.

SUMMARY STEPS

1. **configure**
2. **interface atm** *interface-path-id.subinterface* **point-to-point**
3. **class-int** *vc-class-name*
4. **end**
   or
   commit

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id.subinterface* **point-to-point** **Example:** `RP/0/RP0/CPU0:router (config)# interface atm 0/6/0/1.10 point-to-point`	Enters ATM subinterface configuration mode.
Step 3	**class-int** *vc-class-name* **Example:** `RP/0/RP0/CPU0:router (config-subif)# class-int classA`	Assigns the vc-class to an ATM subinterface. Replace the *vc-class-name* argument with the name of the vc-class you configured in the "Creating and Configuring a VC-Class" section on page -40.

Step 4	**end**
	or
	commit
	
	Example:
	`RP/0/RP0/CPU0:router (config-subif)# end`
	or
	`RP/0/RP0/CPU0:router(config-subif)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:`
		– Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		– Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		– Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Attaching a VC-Class to a PVC on an ATM Subinterface

This section describes the tasks and commands required to attach a vc-class to a PVC on an ATM subinterface.

Note VC-classes are supported on point-to-point and Layer 2 PVCs.

SUMMARY STEPS

1. **configure**
2. **interface atm** *interface-path-id*[*.subinterface*] [**point-to-point** | **l2transport**]
3. **pvc** *vpi*/*vci*
4. **class vc** *vc-class-name*
5. **end**
   or
   commit

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id.subinterface* [**point-to-point** | **l2transport**] **Example:** `RP/0/RP0/CPU0:router (config)# interface atm 0/6/0/1.10`	Enters subinterface configuration mode and creates the ATM subinterface if it does not already exist. Use the **point-to-point** keyword if you are attaching the vc-class to a point-to-point subinterface. Use the **l2transport** keyword if you are attaching the vc-class to a Layer 2 transport subinterface. **Note** For more information on creating and configuring ATM subinterfaces, see the "Creating a Point-to-Point ATM Subinterface with a PVC" section on page 23.
Step 3	**pvc** *vpi*/*vci* **Example:** `RP/0/RP0/CPU0:router (config-if)# pvc 5/50`	Enters ATM PVC configuration mode and creates the PVC if it does not already exist. **Note** For more information on creating and configuring PVCs on ATM subinterfaces, see the "Creating a Point-to-Point ATM Subinterface with a PVC" section on page 23.

	Command or Action	Purpose
Step 4	**class-vc** *vc-class-name* **Example:** `RP/0/RP0/CPU0:router (config-atm-vc)# class-vc classA`	Assigns a vc-class to an ATM PVC. Replace the *vc-class-name* argument with the name of the vc-class you want to attach to the PVC.

Step 5	**end**
	or
	commit
	
	Example:
	`RP/0/RP0/CPU0:router (config-if)# end`
	or
	`RP/0/RP0/CPU0:router(config-if)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:`
		– Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		– Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		– Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

How to Configure ILMI on ATM Interfaces

The configuration tasks for managing ILMI on ATM interfaces are described in the following procedures:

- Enabling ILMI on an ATM Interface, page 47
- Disabling ILMI on an ATM Interface, page 49

Enabling ILMI on an ATM Interface

This task describes the commands you can use to configure an ATM interface for ILMI.

Note For ILMI, a PVC is configured directly on the ATM main interface. Subinterface configuration is not necessary for ATM interfaces that are used for ILMI.

Prerequisites

Bring up the ATM interface and remove the shutdown configuration, as described in the "Bringing Up an ATM Interface" section on page 18.

Restrictions

- The configuration on both ends of the ATM ILMI connection must match for the interface to be active.
- ILMI configuration is not supported on Layer 2 port mode ACs.

SUMMARY STEPS

1. **configure**
2. **interface atm** *interface-path-id*
3. **atm address-registration**
4. **atm ilmi-keepalive** [**act-poll-freq** *frequency*] [**retries** *count*] [**inact-poll-freq** *frequency*]
5. **pvc** *vpi/vci* **ilmi**
6. **end**
   or
   commit
7. **exit**
8. **exit**
9. **show atm ilmi-status** [**atm** *interface-path-id*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id* **Example:** `RP/0/RP0/CPU0:router (config)# interface atm 0/6/0/1`	Enters ATM interface configuration mode.
Step 3	**atm address-registration** **Example:** `RP/0/RP0/CPU0:router (config-if)# atm address-registration`	(Optional) Enables the router to engage in address registration and callback functions with the Interim Local Management Interface (ILMI).
Step 4	**atm ilmi-keepalive** [**act-poll-freq** *frequency*] [**retries** *count*] [**inact-poll-freq** *frequency*] **Example:** `RP/0/RP0/CPU0:router (config-if)# atm ilmi-keepalive`	(Optional) Enables ILMI keepalives on an ATM interface.

	Command or Action	Purpose
Step 5	**pvc** *vpi/vci* **ilmi** **Example:** `RP/0/RP0/CPU0:router (config-if)# pvc 5/30 ilmi`	Creates an ATM permanent virtual circuit (PVC) with ILMI encapsulation.

Step 6	**end**
	or
	commit
	
	Example:
	`RP/0/RP0/CPU0:router (config-if)# end`
	or
	`RP/0/RP0/CPU0:router(config-if)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:`
		– Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		– Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		– Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Step 7	**exit** **Example:** `RP/0/RP0/CPU0:router (config-if)# exit`	Exits interface configuration mode and enters global configuration mode.
Step 8	**exit** **Example:** `RP/0/RP0/CPU0:router (config)# exit`	Exits global configuration mode and enters EXEC mode.
Step 9	**show atm ilmi-status** [**atm** *interface-path-id*] **Example:** `RP/0/RP0/CPU0:router (config)# show atm ilmi-status atm 0/6/0/1`	(Optional) Verifies the ILMI configuration for the specified interface.

Disabling ILMI on an ATM Interface

This task describes the commands you can use to disable ILMI on an ATM interface.

SUMMARY STEPS

1. **configure**
2. **interface atm** *interface-path-id*

3. **atm ilmi-config disable**
4. **end**
   or
   commit
5. **exit**
6. **exit**
7. **show atm ilmi-status** [**atm** *interface-path-id*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id* **Example:** `RP/0/RP0/CPU0:router (config)# interface atm 0/6/0/1`	Enters ATM interface configuration mode.
Step 3	**atm ilmi-config disable** **Example:** `RP/0/RP0/CPU0:router (config-if)# atm ilmi-config disable`	(Optional) Disables ILMI on the ATM interface. To re-enable ILMI on an ATM interface, use the **no atm ilmi-config disable** form of this command.

Step 4	**end**
	or
	commit
	
	Example:
	`RP/0/RP0/CPU0:router (config-if)# end`
	or
	`RP/0/RP0/CPU0:router(config-if)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:`
		– Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		– Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		– Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

	Command or Action	Purpose
Step 5	**exit** **Example:** `RP/0/RP0/CPU0:router (config-if)# exit`	Exits interface configuration mode and enters global configuration mode.
Step 6	**exit** **Example:** `RP/0/RP0/CPU0:router (config)# exit`	Exits global configuration mode and enters EXEC mode.
Step 7	**show atm ilmi-status** [**atm** *interface-path-id*] **Example:** `RP/0/RP0/CPU0:router (config)# show atm ilmi-status atm 0/6/0/1`	(Optional) Verifies the ILMI configuration for the specified interface.

Attaching a Service-Policy to an Attachment Circuit

The QoS **service-policy** command can be configured for an attachment circuit in the following modes:

- PVC mode
- PVP mode
- Port mode
- Main Interface (non-port mode)

In PVC mode, PVP mode, and Port mode, the service policy is attached in the l2transport sub-interface mode. In non-port mode, the service policy is attached to the main interface.

Use the following procedures to attach a service-policy to an attachment circuit.

SUMMARY STEPS

PVC Mode

1. **config**
2. **interface atm** *interface-path-id.subinterface* **l2transport**
3. **pvc** *vpi/vci*
4. **service-policy input | output** *policy_name*
5. **commit**

PVP Mode

1. **config**
2. **interface atm** *interface-path-id.subinterface* **l2transport**
3. **pvp** *vpi*
4. **service-policy input | output** *policy_name*
5. **commit**

Port Mode

1. **config**
2. **interface atm** *interface-path-id*
3. **l2transport**
4. **service-policy input | output** *policy_name*
5. **commit**

Main Interface (non-port mode)

1. **config**
2. **interface atm** *interface-path-id*
3. **service-policy input | output** *policy_name*
4. **commit**

DETAILED STEPS

	Command or Action	Purpose
PVC Mode		
Step 1	**config** **Example:** `RP/0/RP0/CPU0:router# config terminal`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id.subinterface* **l2transport** **Example:** `RP/0/RP0/CPU0:router(config)# interface atm 0/1/0/0.2 l2transport`	Creates a subinterface and enters ATM subinterface configuration mode for that subinterface.
Step 3	**interface atm** *interface-path-id* **Example:** `RP/0/RP0/CPU0:router (config)# interface atm 0/1/0/1`	Enters interface configuration mode for an ATM interface.
Step 4	**service-policy input | output** *policy_name* **Example:** `RP/0/RP0/CPU0(config-atm-l2transport-pvc)#service-policy input | output atm_policy_1`	Attaches the specified service policy to the ATM PVC subinterface.
Step 5	**commit** **Example:** `RP/0/RP0/CPU0:router(config-if)# commit`	Saves configuration changes.
PVP Mode		
Step 1	**config** **Example:** `RP/0/RP0/CPU0:router# config terminal`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id.subinterface* **l2transport** **Example:** `RP/0/RP0/CPU0:router(config)# interface atm 0/1/0/0.2 l2transport`	Creates a subinterface and enters ATM subinterface configuration mode for that subinterface.
Step 3	**pvp** *vpi* **Example:** `RP/0/RP0/CPU0:router(config-subif)# pvp 30`	(Optional) Creates an ATM PVP and enters ATM PVP configuration submode. **Note** Only one PVP is allowed per subinterface.

	Command or Action	Purpose
Step 4	**service-policy input | output** *policy_name* **Example:** `RP/0/RP0/CPU0(config-atm-l2transport-pvp)#service-policy input | output atm_policy_2`	Attaches the specified service policy to the ATM PVP subinterface.
Step 5	**commit** **Example:** `RP/0/RP0/CPU0:router(config-if)# commit`	Saves configuration changes.
Port Mode		
Step 1	**config** **Example:** `RP/0/RP0/CPU0:router# config terminal`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id* **Example:** `RP/0/RP0/CPU0:router (config)# interface atm 0/1/0/1`	Enters interface configuration mode for an ATM interface.
Step 3	**l2transport** **Example:** `RP/0/RP0/CPU0:router (config-if)# l2transport`	Enters ATM Layer 2 transport configuration mode, and enables Layer 2 port mode on this ATM interface.
Step 4	**service-policy input | output** *policy_name* **Example:** `RP/0/RP0/CPU0(config-if-l2)#service-policy input | output atm_policy_3`	Attaches the specified service policy to the ATM Layer 2 subinterface.
Step 5	**commit** **Example:** `RP/0/RP0/CPU0:router(config-if)# commit`	Saves configuration changes.
Main Interface (non-port mode)		
Step 1	**config** **Example:** `RP/0/RP0/CPU0:router# config terminal`	Enters global configuration mode.
Step 2	**interface atm** *interface-path-id* **Example:** `RP/0/RP0/CPU0:router (config)# interface atm 0/1/0/1`	Enters interface configuration mode for an ATM interface.

	Command or Action	Purpose
Step 3	**service-policy input | output** *policy_name* **Example:** `RP/0/RP0/CPU0(config-if)#service-policy input | output atm_policy_4`	Attaches the specified service policy to the main ATM interface.
Step 4	**commit** **Example:** `RP/0/RP0/CPU0:router(config-if)# commit`	Saves configuration changes.

ATM Configuration: Examples

This section provides the following configuration examples:

ATM Interface Bring Up and Configuration: Example

The following example shows how to bring up and configure an ATM interface:

```
RP/0/RP0/CPU0:router # configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/0
RP/0/RP0/CPU0:router(config-if)# atm address-registration
RP/0/RP0/CPU0:router(config-if)# no shutdown
RP/0/RP0/CPU0:router(config-if)# commit
```

Point-To-Point ATM Subinterface Configuration: Example

The following example shows how to configure a point-to-point ATM subinterface on an ATM main interface:

```
RP/0/RP0/CPU0:router # configure
RP/0/RP0/CPU0:router (config)# interface atm 0/2/0/2.1 point-to-point
RP/0/RP0/CPU0:router (config-if)# ipv4 address 10.46.8.6/24
RP/0/RP0/CPU0:router (config-if)# pvc 0/200
RP/0/RP0/CPU0:router (config-atm-vc)# commit
RP/0/RP0/CPU0:router (config-atm-vc)# exit
RP/0/RP0/CPU0:router (config-if)# exit
RP/0/RP0/CPU0:router (config)# exit

RP/0/RP0/CPU0:router # show interfaces atm 0/2/0/2.1

ATM0/2/0/2.1 is up, line protocol is up
  Hardware is ATM network sub-interface(s)
```

```
  Description: Connect to P4_C12810 ATM 1/2.1
  Internet address is 10.46.8.6/24
  MTU 4470 bytes, BW 155000 Kbit
     reliability Unknown, txload Unknown, rxload Unknown
  Encapsulation AAL5/SNAP, controller loopback not set,
  Last clearing of "show interface" counters Unknown
  Datarate information unavailable.
  Interface counters unavailable.

RP/0/RP0/CPU0:router # show atm interface atm 0/2/0/3

Interface                           : ATM0/2/0/3
AAL Enabled                         : AAL5
Max-VP                              : 254
Max-VC                              : 2046
Configured L2 PVPs                  : 0
Configured L2 PVCs                  : 0
Configured L3 VP-Tunnels            : 0
Configured L3 PVCs                  : 1
L2 PVPs in Down State               : 0
L2 PVCs in Down State               : 0
L3 VP-Tunnels in Down State         : 0
L3 PVCs in Down State               : 0
Cell packing count                  : 0

Received Side Statistics:
    Received Cells                  : 0
    Received Bytes                  : 0
    Received AAL Packets            : 0

Receive Side Cells Dropped:
    Unrecognized VPI/VCI            : 0

Receive Side AAL5 Packets Dropped:
    Unavailable SAR Buffer          : 0
    Non-Resource Exhaustion         : 0
    Reassembly Timeout              : 0
    Zero Length                     : 0
    Unavailable Host Buffer         : 0
    Packet size exceeds MPS         : 0
    AAL5 Trailer Length Errors      : 0

Transmit Side Statistics:
    Transmitted Cells               : 1899716067
    Transmitted Bytes               : 0
    Transmitted AAL Packets         : 0

Transmit Side Cells Dropped:
    Unrecognized VPI/VCI            : 0

Transmit Side AAL5 Packets Dropped:
    Unavailable SAR Buffer          : 0
    Non-Resource Exhaustion         : 0
    WRED Threshold                  : 0
    WRED Random                     : 0

RP/0/RP0/CPU0:router # show atm pvc 10/100

Detailed display of VC(s) with VPI/VCI = 10/100

ATM0/2/0/3.100: VPI: 10 VCI: 100
UBR, PeakRate: 622000 Kbps
AAL5-LLC/SNAP
OAM frequency: 10 second(s), OAM retry frequency: 1 second(s),
```

```
OAM up retry count: 3, OAM down retry count: 5,
OAM Keep-vc-up: False, OAM AIS-RDI failure: None,
OAM AIS-RDI down count: 1, OAM AIS-RDI up time: 3 second(s),
OAM Loopback status: No loopback enabled,
OAM VC state: Loopback Not verified,
VC is not managed by OAM,

OAM cells received: 0,
F5 InEndLoop: 0, F5 InSegLoop: 0,
F5 InEndAIS: 0,  F5 InSegAIS: 0,
F5 InEndRDI: 0,  F5 InSegRDI: 0,
OAM cells sent: 0,
F5 OutEndLoop: 0, F5 OutSegLoop: 0,
F5 OutEndAIS: 0,  F5 OutSegAIS: 0,
F5 OutEndRDI: 0,  F5 OutSegRDI: 0,
OAM cells drops: 0

InPkts: 0                    OutPkts: 0
InBytes: 0                   OutBytes: 0
WRED pkt drop: 0
Non WRED pkt drop: 0

Internal state: READY
Status: UP
```

Layer 2 AC Creation and Configuration: Example

The following example shows how to create and configure one endpoint of a Layer 2 port mode AC:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router (config)# interface atm 0/6/0/1
RP/0/RP0/CPU0:router (config-if)# l2transport
RP/0/RP0/CPU0:router (config-if-l2)# cell-packing 6 1
RP/0/RP0/CPU0:router(config-if-l2)# commit
```

The following example shows how to create and configure an AC on a Layer 2 subinterface with a PVC:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/1/0/0.230 l2transport
RP/0/RP0/CPU0:router(config-if)# pvc 15/230
RP/0/RP0/CPU0:router(config-atm-l2transport-pvc)# encapsulation aal0
RP/0/RP0/CPU0:router(config-atm-l2transport-pvc)# cell-packing 5 2
RP/0/RP0/CPU0:router(config-atm-l2transport-pvc)# shape cbr 622000
RP/0/RP0/CPU0:router(config-atm-l2transport-pvc)# commit
RP/0/RP0/CPU0:router(config-atm-l2transport-pvc)#
RP/0/RP0/CPU0:router(config-if)# exit
RP/0/RP0/CPU0:router(config)# exit
RP/0/RP0/CPU0:router# show atm pvc

                                          Peak  Avg/Min  Burst
Interface          VPI  VCI Type  Encaps  SC   Kbps   Kbps    Cells  Sts
ATM0/1/0/0.230      15  230 PVC   AAL0    UBR  622000    N/A     N/A   UP
ATM0/1/0/3.19       17   19 PVC   SNAP    UBR  622000    N/A     N/A   UP
```

The following example shows how to create and configure an AC on an ATM subinterface with a PVP:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/1.10 l2transport
RP/0/RP0/CPU0:router(config-if)# pvp 100
RP/0/RP0/CPU0:router(config-atm-l2transport-pvp)# cell-packing 5 2
RP/0/RP0/CPU0:router(config-atm-l2transport-pvp)# shape ubr 155000
RP/0/RP0/CPU0:router(config-atm-l2transport-pvp)# commit

RP/0/RP0/CPU0:router# show atm pvp interface atm 0/6/0/1

                                  Peak  Avg/Min   Burst
Interface          VPI  SC        Kbps     Kbps   Cells      Sts
ATM0/6/0/1.10      100  UBR       155000    N/A      N/A        UP
```

VC-Class Creation and Configuration: Example

The following example shows how to configure a vc-class:

```
RP/0/RP0/CPU0:router # configure
RP/0/RP0/CPU0:router(config)# vc-class atm atm-class-1
RP/0/RP0/CPU0:router(config-vc-class-atm)# encapsulation aal5snap
RP/0/RP0/CPU0:router(config-vc-class-atm)# oam ais-rdi 25 5
RP/0/RP0/CPU0:router(config-vc-class-atm)# oam retry 5 10 5
RP/0/RP0/CPU0:router(config-vc-class-atm)# oam-pvc manage 300
RP/0/RP0/CPU0:router(config-vc-class-atm)# shape cbr 100000
RP/0/RP0/CPU0:router(config-vc-class-atm)# commit
```

The following example shows how to attach a vc-class to an ATM main interface:

```
RP/0/RP0/CPU0:router # configure
RP/0/RP0/CPU0:router(config)# interface ATM0/2/0/0.1 point-to-point
RP/0/RP0/CPU0:router (config-if)# class-int atm-class-1
RP/0/RP0/CPU0:router (config-if)# commit
```

The following example shows how to attach a vc-class to an ATM subinterface:

```
RP/0/RP0/CPU0:router # configure
RP/0/RP0/CPU0:router(config)# interface ATM0/2/0/0.1 point-to-point
RP/0/RP0/CPU0:router(config-if)# pvc 10/100
RP/0/RP0/CPU0:router (config-atm-vc)# class-vc atm-class-1
RP/0/RP0/CPU0:router (config-atm-vc)# commit
```

The following example shows how to display information about a specific ATM vc-class:

```
RP/0/RP0/CPU0:router # show atm vc-class atm-class-1
ATM vc-class atm-class-1

  encapsulation          -    aal5snap
  shape                  -    cbr 100000
  oam ais-rdi            -    not configured
  oam retry              -    not configured
  oam-pvc                -    manage 300
```

The following example shows how to display configuration information for the parameters on a virtual circuit (VC) class that is associated with a particular PVC:

```
RP/0/RP0/CPU0:router # show atm class-link 10/100

Detailed display of VC(s) with VPI/VCI = 10/100

Class link for VC 10/100
ATM0/2/0/0.1: VPI: 10 VCI: 100
```

```
shape : cbr 100000 (VC-class configured on VC)
encapsulation : aal5snap (VC-class configured on VC)
oam-pvc : manage 300   (VC-class configured on VC)
oam retry : 3 5 1 (Default value)
oam ais-rdi : 1 3 (Default value)
```

ATM Layer 2 QoS Configuration: Examples

The following examples show how to configure QoS for ATM. For complete information on configuring QoS and QoS commands, refer to the Cisco XR 12000 Series Router Modular Quality of Service Configuration Guide and the Cisco XR 12000 Series Router Modular Quality of Service Command Reference.

Attaching a Service-Policy to an Attachment Circuit Configuration: Example

PVC Mode

```
config
   interface ATM 0/1/0/0.2 l2transport
      pvc 10/2
         service-policy input | output atm_policy_o
```

PVP Mode

```
config
   interface ATM 0/1/0/0.3 l2transport
      pvp 30
         service-policy input atm_policy_i
```

Port Mode

```
config
   interface ATM 0/1/0/0
      l2transport
         service-policy input atm_policy_i
```

Main Interface (non-port mode)

```
config
   interface ATM 0/1/0/0
      service-policy input | output atm_policy_o
```

Policy Map Configuration for CBR/UBR: Example

For CBR.1 (real-time traffic) and UBR (best effort, non-real time traffic) you must specify the PCR and delay tolerance parameters for policing. The main difference between the configurations for UBR.1 and UBR.2 traffic is that for UBR.2 traffic, the exceed action includes the **set-clp-transmit** option to tag non-conforming cells. The police rate can also be expressed as a percentage.

The following example shows how to configure a QoS policy map for CBR/UBR:

```
policy-map CBR1
    class class-default
          police rate pcr cellsps delay-tolerance cdvt us
               conform-action action
               exceed-action action
```

Policy Map Configuration for VBR.1: Example

For VBR.1 real-time and non-real time traffic you must specify the PCR, SCR, and delay tolerance parameters for for policing. The **atm-mbs** parameter can be specified to define the burst allowed on the SCR bucket. The police rates can also be expressed as percentages. Class atm_clp1 is allowed with police actions.

The following example shows how to configure a QoS policy map for VBR.1:

```
policy-map VBR1
    class class-default
          police rate scr cellsps atm-mbs mbs cells peak-rate pcr cellsps delay-tolerance
cdvt us
               conform-action action
               exceed-action action
```

Policy Map Configuration for VBR.2 and VBR.3: Example

For VBR.2 and VBR.3 real-time and non-real time traffic you must specify the PCR, SCR, and delay tolerance parameters for policing. The **atm-mbs** parameter can be specified to define the burst allowed on the SCR bucket. The main difference between VBR.1 and VBR.2/VBR.3 is that the SCR bucket is for CLP0 cells only. The police rates can be expressed as percentages. The child policy can have other set actions and can match on ATM CLP1.

The following example shows how to configure a hierarchical policy for VBR.2:

```
policy-map child
    class atm_clp0
          police rate scr cellsps atm-mbs mbs cells
               conform-action action
               exceed-action action

policy-map VBR2
    class class-default
          police rate pcr cellsps delay-tolerance cdvt us
               conform-action action
               exceed-action action
      service-policy child
```

Policy Map Configuration to Exclude OAM Cells: Example

OAM cells can be excluded from being policed by configuring the classification criteria. Since **match not** is not supported, the different classes must be explicitly configured:.

The following example shows how to configure a policy map to exclude OAM cells:

```
class-map clp-0-1
 match clp 0
 match clp 1

policy-map child
    class atm-oam
        set
    class class-default
          police rate scr cellsps atm-mbs mbs cells
               conform-action action
               exceed-action action

policy-map VBR2
    class clp-0-1
```

```
        police rate pcr cellsps delay-tolerance cdvt us
             conform-action action
             exceed-action action
    service-policy child
```

Policy Map Configuration for Dual Queue Limit: Example

Dual Queue limit configuration is supported on egress L2 ATM interfaces to differentiate between CLP0 and CLP1 cells.

Note For dual queue, only output service policies are supported. Input service policies are not supported.

The following example shows how to configure a policy map for Dual Queue Limit:

```
policy-map q-limit
    class class-default
        queue-limit atm-clp Threshold {[ms|us|cells]} Tail-drop-threshold {[ms|us|cells]}
```

Verifying ATM Layer 2 QoS Configuration: Examples

The following examples show how to display policing results for an ATM interface policy map:

```
show policy-map interface ATM 0/3/0/0.12 input

ATM 0/3/0/0.12 input: pvc1

Class class-default
  Classification statistics          (packets/bytes)     (rate - kbps)
    Matched             :                0/0               0
    Transmitted         :                0/0               0
    Total Dropped       :                0/0               0

show policy-map interface ATM 0/3/0/0.12 output

ATM 0/3/0/0.12 output: pvc1

Class class-default
  Classification statistics          (packets/bytes)     (rate - kbps)
    Matched             :                0/0               0
    Transmitted         :                0/0               0
    Total Dropped       :                0/0               0
```

The following examples show how to display the configured QoS properties for an ATM interface policy map:

```
show qos interface atm 0/3/0/0.12 input

Interface ATM0_3_0_0.12  --   Direction: input
Policy                 :   pvc1
Total number of classes:   1
Cell Packing Criteria = CELL_PACK_TIMER_MTU
------------------------------------------------------
LEVEL1 class: classid    =   0x1
class name               =   class-default
new exp                  =   6

show qos interface atm 0/3/0/0.12 output
```

```
Interface ATM0_3_0_0.12  --   Direction: output
Policy                 :   pvc1
Total number of classes:   1
Cell Packing Criteria = CELL_PACK_TIMER_MTU
------------------------------------------------
LEVEL1 class: classid    =   0x1
class name               =   class-default
new exp                  =   6
```

Additional References

The following sections provide references related to implementing ATM for Cisco IOS XR software.

Related Documents

Related Topic	Document Title
ATM commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples	*Cisco IOS XR Interface and Hardware Command Reference*

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIBs	MIBs Link
—	To locate and download MIBs using Cisco IOS XR software, use the Cisco MIB Locator found at the following URL and choose a platform under the Cisco Access Products menu: http://cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

RFCs

RFCs	Title
RFC 1483	*Multiprotocol Encapsulation over ATM Adaptation Layer 5*
RFC 1577	*Classical IP and ARP over ATM.*
RFC 2225	*Classical IP and ARP over ATM*
RFC 2255	*The LDAP URL Format*
RFC 2684	*Multiprotocol Encapsulation over ATM Adaptation Layer 5.*
RFC 4385	*Pseudowire Emulation Edge-to-Edge (PWE3) Control Word for Use over an MPLS PSN*
RFC 4717	*Encapsulation Methods for Transport of Asynchronous Transfer Mode (ATM) over MPLS Networks*
RFC 4816	*Pseudowire Emulation Edge-to-Edge (PWE3) Asynchronous Transfer Mode (ATM) Transparent Cell Transport Service*

Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of 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/techsupport