Configuring ATM

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This chapter describes how to configure ATM on the Cisco ASR 1000 Series Aggregation Services Routers.

Finding Feature Information

For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the "Feature Information for Configuring ATM" section on page 22.

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

Contents

To configure ATM, complete the tasks in the following sections. The first task is required, and then you must configure at least one PVC. The virtual circuit options you configure must match in three places: on the router, on the ATM switch, and at the remote end of the PVC connection. The remaining tasks are optional.

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Enabling the ATM Interface

This section describes how to configure an ATM interface. For the AIP, all ATM port adapters, and the 1-port ATM-25 network module, the port number is always 0. For example, the *slot*/*port* address of an ATM interface on an AIP installed in slot 1 is 1/0.

To configure the ATM interface, use the following commands beginning in privileged EXEC mode:

	Command	Purpose
Step 1	`Router# configure terminal`	Enters global configuration mode from the terminal.

Step 2	`Router(config)# interface atm slot/0`
	or
	`Router(config)# interface atm slot/port-adapter/0`
	or
	`Router(config)# interface atm number`
		Specifies the ATM interface using the appropriate format of the **interface atm** command. To determine the correct form of the interface atm command, consult your ATM network module, port adapter, or router documentation.

Step 3	`Router(config-if)# ip address ip-address mask`	(Optional) If IP routing is enabled on the system, assigns a source IP address and subnet mask to the interface.

To enable the ATM interface, use the following command in interface configuration mode:

Command	Purpose
`Router(config-if)# no shutdown`	Changes the shutdown state to up and enables the ATM interface, thereby beginning the segmentation and reassembly (SAR) operation on the interface.

The **no shutdown** command passes an **enable** command to the ATM interface, which then begins segmentation and reassembly (SAR) operations. It also causes the ATM interface to configure itself based on the previous configuration commands sent.

Configuring PVCs

To use a permanent virtual circuit (PVC), you must configure the PVC into both the router and the ATM switch. PVCs remain active until the circuit is removed from either configuration.

When a PVC is configured, all the configuration options are passed on to the ATM interface. These PVCs are writable into the nonvolatile RAM (NVRAM) as part of the Route Processor (RP) configuration and are used when the RP image is reloaded.

Some ATM switches might have point-to-multipoint PVCs that do the equivalent of broadcasting. If a point-to-multipoint PVC exists, then that PVC can be used as the sole broadcast PVC for all multicast requests.

To configure a PVC, perform the tasks in the following sections. The first two tasks are required; the other tasks are optional.

- Creating a PVC (Required)

- Mapping a Protocol Address to a PVC (Required)
- Configuring the AAL and Encapsulation Type (Optional)
- Configuring PVC Traffic Parameters (Optional)
- Enabling Inverse ARP (Optional)
- Enabling Access Node Control Protocol (ANCP) on an ATM Interface (Optional)
- Enabling Access Node Control Protocol (ANCP) on an ATM Interface (Optional)
- Configuring Broadcast on a PVC (Optional)
- Assigning a VC Class to a PVC (Optional)
- Configuring PVC Trap Support (Optional)

Creating a PVC

To create a PVC on the ATM interface and enter interface-ATM-VC configuration mode, use the following command beginning in interface configuration mode:

Command	Purpose
`Router(config-if)# pvc [name] vpi/vci`	Configures a new ATM PVC by assigning a name (optional) and VPI/VCI numbers. Enters interface-ATM-VC configuration mode.

Note After configuring the parameters for an ATM PVC, you must exit interface-ATM-VC configuration mode in order to create the PVC and enable the settings.

Once you specify a name for a PVC, you can reenter the interface-ATM-VC configuration mode by simply entering **pvc** *name*.

See examples of PVC configurations in the section "ATM Configuration Examples".

Mapping a Protocol Address to a PVC

The ATM interface supports a static mapping scheme that identifies the network address of remote hosts or routers. This section describes how to map a PVC to an address, which is a required task for configuring a PVC.

To map a protocol address to a PVC, use the following command in interface-ATM-VC configuration mode:

Command	Purpose
`Router(config-if-atm-vc)# protocol protocol protocol-address [[no] broadcast]`	Maps a protocol address to a PVC.

Note If you enable or disable broadcasting directly on a PVC using the **protocol** command, this configuration will take precedence over any direct configuration using the **broadcast** command.

See examples of PVC configurations in the section "ATM Configuration Examples".

Configuring the AAL and Encapsulation Type

To configure the ATM adaptation layer (AAL) and encapsulation type, use the following command beginning in interface-ATM-VC configuration mode:

Command	Purpose
`Router(config-if-atm-vc)#` **`encapsulation aal5`***`encap`*	Configures the ATM adaptation layer (AAL) and encapsulation type.

For a list of AAL types and encapsulations supported for the *aal-encap* argument, refer to the **encapsulation aal5** command in the "ATM Commands" chapter of the *Cisco IOS Wide-Area Networking Command Reference*. The global default is AAL5 with SNAP encapsulation.

Configuring PVC Traffic Parameters

The supported traffic parameters are part of the following service categories: Constant Bit Rate (CBR), Unspecified Bit Rate (UBR), Variable Bit Rate Non Real-Time (VBR-NRT), and real-time Variable Bit Rate (VBR). Only one of these categories can be specified per PVC connection so if a new one is entered, it will replace the existing one.

To configure PVC traffic parameters, use one of the following commands beginning in interface-ATM-VC configuration mode:

Command	Purpose
`Router(config-if-atm-vc)#` **`cbr`** *`peak_cell_rate_KBPS`*	Configures the Constant Bit Rate (CBR).
`Router(config-if-atm-vc)#` **`ubr`** *`output-pcr`*	Configures the Unspecified Bit Rate (UBR).
`Router(config-if-atm-vc)#` **`vbr-nrt`** *`output-pcr output-scr output-mbs`*	Configures the Variable Bit Rate-Non Real Time (VBR-NRT) QOS.
`Router(config-if-atm-vc)#` **`vbr-rt`** *`peak-rate average-rate burst`*	Configures the real-time Variable Bit Rate (VBR). (Cisco MC3810 and Multiport T1/E1 ATM Network Module only.)

The *-pcr* and *-mcr* arguments are the peak cell rate and minimum cell rate, respectively. The *-scr* and *-mbs* arguments are the sustainable cell rate and maximum burst size, respectively.

For a description of how to configure traffic parameters in a VC class and apply the VC class to an ATM interface or subinterface, refer to the section "Configuring VC Classes."

Note The commands in this section are not supported on the ATM port adapter (PA-A1 series). The 1-port ATM-25 network module only supports UBR.

Enabling Inverse ARP

Inverse ARP is enabled by default when you create a PVC using the **pvc** command. Once configured, a protocol mapping between an ATM PVC and a network address is learned dynamically as a result of the exchange of ATM Inverse ARP packets.

Inverse ARP is supported on PVCs running IP or IPX and no static map is configured. If a static map is configured, Inverse ARP will be disabled.

To enable Inverse ARP on an ATM PVC, use the following commands beginning in global configuration mode:

	Command	Purpose

Step 1	`Router(config)# interface atm slot/0[.subinterface-number {multipoint | point-to-point}]`
	or
	`Router(config)# interface atm slot/port-adapter/0[.subinterface-number {multipoint | point-to-point}]`
	or
	`Router(config)# interface atm number[.subinterface-number {multipoint | point-to-point}]`
		Specifies the ATM interface using the appropriate format of the **interface atm** command.[1]

Step 2	`Router(config-if)# pvc [name] vpi/vci`	Specifies an ATM PVC by name (optional) and VPI/VCI numbers.
Step 3	`Router(config-if-atm-vc)# encapsulation aal5snap`	Configures AAL5 LLC-SNAP encapsulation if it is not already configured.
Step 4	`Router(config-if-atm-vc)# inarp minutes`	(Optional) Adjusts the Inverse ARP time period.

1. To determine the correct form of the **interface atm** command, consult your ATM network module, port adapter, or router documentation.

When PVC discovery is enabled on an active PVC and the router terminates that PVC, the PVC will generate an ATM Inverse ARP request. This allows the PVC to resolve its own network addresses without configuring a static map.

Address mappings learned through Inverse ARP are aged out. However, mappings are refreshed periodically. This period is configurable using the **inarp** command, which has a default of 15 minutes.

You can also enable Inverse ARP using the **protocol** command. This is necessary only if you disabled Inverse ARP using the **no protocol** command. For more information about this command, refer to the "ATM Commands" chapter in the *Cisco IOS Wide-Area Networking Command Reference*.

For an example of configuring Inverse ARP, see the section "Enabling Inverse ARP Example".

Enabling Access Node Control Protocol (ANCP) on an ATM Interface

The **ancp enable** command should be configured only for the control VCs on which the ANCP message is sent from the DSLAM. Use the following procedure to enable ANCP on ATM interfaces.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ancp adjacency timer** *interval*
4. **interface atm** *slot/subslot/port.subinterface*
5. **ip address** *ip-address mask*
6. **pvc** *vpi/vci*
7. **ancp enable**
8. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ancp adjacency timer** *interval* **Example:** `Router(config)# ancp adjacency timer 100`	Sets the ANCP adjacency timer interval, which specifies the amount of time to wait before sending an ANCP hello packet to the DSLAM. • Valid values are defined in units of 100 milliseconds (ms). Default: 100 (10 seconds).
Step 4	**interface atm** *slot/subslot/port.subinterface* **Example:** `Router(config)# interface atm 2/0/1.1`	Creates or modifies a subinterface and enters subinterface configuration mode.
Step 5	**ip address** *ip-address mask* **Example:** `Router(config-subif)# ip address 10.16.1.2 255.255.0.0`	Assigns an IP address and subnet mask to the subinterface.
Step 6	**pvc** *vpi/vci* **Example:** `Router(config-subif)# pvc 2/100`	Enables an ANCP connection over ATM PVC and enters ATM virtual circuit configuration mode.

	Command or Action	Purpose
Step 7	**ancp enable** **Example:** `Router(config-if-atm-vc)# ancp enable`	Enables ANCP on the interface where IP is configured.
Step 8	**exit** **Example:** `Router(config-if-atm-vc)# exit`	Exits ATM virtual circuit configuration mode.

For an example of enabling ANCP, see the section "Enabling Access Node Control Protocol on ATM Interfaces Example".

Configuring Generation of End-to-End F5 OAM Loopback Cells to Verify Connectivity

You can optionally configure the PVC to generate end-to-end F5 OAM loopback cells to verify connectivity on the virtual circuit. The remote end must respond by echoing back such cells. If OAM response cells are missed (indicating the lack of connectivity), the PVC state goes down. If all the PVCs on a subinterface go down, the subinterface goes down.

To configure transmission of end-to-end F5 OAM cells on a PVC, use the following commands in interface-ATM-VC configuration mode:

	Command	Purpose
Step 1	`Router(config-if-atm-vc)# oam-pvc [manage] frequency`	Configures transmission of end-to-end F5 OAM loopback cells on a PVC, specifies how often loopback cells should be sent, and optionally enables OAM management of the connection.
Step 2	`Router(config-if-atm-vc)# oam retry up-count down-count retry-frequency`	(Optional) Specifies OAM management parameters for verifying connectivity of a PVC connection. This command is only supported if OAM management is enabled.

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

For information about managing PVCs using OAM, see the section "Configuring OAM Management for PVCs".

For an example of OAM loopback cell generation, see the section "Configuring Generation of End-to-End F5 OAM Loopback Cells Example".

Configuring Broadcast on a PVC

To send duplicate broadcast packets for all protocols configured on a PVC, use the following command in interface-ATM-VC configuration mode:

Command	Purpose
`Router(config-if-atm-vc)# broadcast`	Sends duplicate broadcast packets for all protocols configured on a PVC.

Note If you enable or disable broadcasting directly on a PVC using the **protocol** command, this configuration will take precedence over any direct configuration using the **broadcast** command.

Assigning a VC Class to a PVC

By creating a VC class, you can preconfigure a set of default parameters that you may apply to a PVC. To create a VC class, refer to the section "Configuring VC Classes".

Once you have created a VC class, use the following command in interface-ATM-VC configuration mode to apply the VC class to a PVC:

Command	Purpose
`Router(config-if-atm-vc)# class-vc` *`vc-class-name`*	Applies a VC class to a PVC.

The *vc-class-name* argument is the same as the *name* argument you specified when you created a VC class using the **vc-class atm** command. Refer to the section "Configuring VC Classes" for a description of how to create a VC class.

Configuring PVC Trap Support

You can configure the PVC to provide failure notification by sending a trap when a PVC on an ATM interface fails or leaves the UP operational state.

PVC Failure Notification

Only one trap is generated per hardware interface, within the specified interval defined by the interval "atmIntPvcNotificationInterval". If other PVCs on the same interface go DOWN during this interval, traps are generated and held until the interval has elapsed. Once the interval has elapsed, the traps are sent if the PVCs are still DOWN.

No trap is generated when a PVC returns to the UP state after having been in the DOWN state. If you need to detect the recovery of PVCs, you must use the SNMP management application to regularly poll your router.

PVC Status Tables

When PVC trap support is enabled, the SNMP manager can poll the SNMP agent to get PCV status information. The table "atmInterfaceExtTable" provides PVC status on an ATM interface. The table "atmCurrentlyFailingPVclTable" provides currently failing and previously failed PVC time-stamp information.

Note PVC traps are only supported on permanent virtual circuit links (PVCLs), not permanent virtual path links (PVPLs).

Prerequisites

Before you enable PVC trap support, you must configure SNMP support and an IP routing protocol on your router. See the "ATM Configuration Examples" section.

For more information about configuring SNMP support, refer to the chapter "*Configuring SNMP Support*" in the *Cisco IOS Configuration Fundamentals Configuration Guide*.

For information about configuring IP routing protocols, refer to the *Cisco IOS IP Routing Protocols Configuration Guide*.

To receive PVC failure notification and access to PVC status tables on your router, you must have the Cisco PVC trap MIB called CISCO-IETF-ATM2-PVCTRAP-MIB.my compiled in your NMS application. You can find this MIB on the Web at Cisco's MIB websiteat the URL: *http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml*.

Enabling PVC Trap Support

When you configure PVC trap support, you must also enable OAM management on the PVC. To enable PVC trap support and OAM management, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# snmp-server enable traps atm pvc interval seconds fail-interval seconds`	Enables PVC trap support.

Step 2	`Router(config)# interface atm slot/0[.subinterface-number {multipoint | point-to-point}]`
	or
	`Router(config)# interface atm slot/port-adapter/0[.subinterface-number {multipoint | point-to-point}]`
	or
	`Router(config)# interface atm number[.subinterface-number {multipoint | point-to-point}]`
		Specifies the ATM interface using the appropriate form of the **interface atm** command.[1]

Step 3	`Router(config-if)# pvc [name] vpi/vci`	Enables the PVC.
Step 4	`Router(config-if-atm-vc)# oam-pvc manage`	Enables end-to-end OAM management for an ATM PVC.

1. To determine the correct form of the **interface atm** command, consult your ATM network module, port adapter, or router documentation.

For more information on OAM management, see the section "Configuring OAM Management for PVCs" later in this chapter.

The new objects in this feature are defined in the IETF draft *The Definitions of Managed Objects for ATM Management*, which is an extension to the AToM MIB (RFC 1695).

For an example of configuring PVC trap support, see the section "Configuring PVC Trap Support Example".

Configuring VC Classes

A VC class is a set of preconfigured VC parameters that you configure and apply to a particular VC or ATM interface. You may apply a VC class to an ATM main interface, subinterface, or PVC. For example, you can create a VC class that contains VC parameter configurations that you will apply to a particular PVC. You might create another VC class that contains VC parameter configurations that you will apply to all VCs configured on a particular ATM main interface or subinterface. Refer to the "ATM Configuration Examples" section for examples of VC class configurations.

To create and use a VC class, complete the tasks in the following sections:

- Creating a VC Class
- Configuring VC Parameters
- Applying a VC Class

Creating a VC Class

To create a VC class, use the following command in global configuration mode:

Command	Purpose
`Router(config)# vc-class atm name`	Creates a VC class and enters vc-class configuration mode.

For examples of creating VC classes, see the section "Creating a VC Class Example".

Configuring VC Parameters

After you create a VC class and enter vc-class configuration mode, configure VC parameters using one or more of the following commands:

- **broadcast**
- **cbr**
- **encapsulation aal5**
- **idle-timeout**
- **inarp**
- **oam-pvc**

- **oam retry**
- **protocol**
- **ubr**
- **vbr-nrt**

Refer to the sections "Configuring PVCs" and "Configuring PVC Trap Support" for descriptions of how to configure these commands for PVCs.

For examples of creating VC classes, see the section "Creating a VC Class Example".

Applying a VC Class

Once you have created and configured a VC class, you can apply it directly on an ATM PVC, or you can apply it on an ATM interface or subinterface.

To apply a VC class directly on an ATM PVC use the following commands beginning in interface configuration mode:

	Command	Purpose
Step 1	`Router(config-if)# pvc [name] vpi/vci`	Specifies an ATM PVC
Step 2	`Router(config-if-atm-vc)# class-vc vc-class-name`	Applies a VC class directly on the PVC.

To apply a VC class on an ATM main interface or subinterface, use the following commands beginning in global configuration mode:

	Command	Purpose

Step 1	`Router(config)# interface atm slot/0[.subinterface-number {multipoint | point-to-point}]`
	or
	`Router(config)# interface atm slot/port-adapter/0[.subinterface-number {multipoint | point-to-point}]`
	or
	`Router(config)# interface atm number[.subinterface-number {multipoint | point-to-point}]`
		Specifies the ATM interface using the appropriate format of the **interface atm** command.[1]

Step 2	`Router(config-if)# class-int vc-class-name`	Applies a VC class on an the ATM main interface or subinterface.

1. To determine the correct form of the **interface atm** command, consult your ATM network module, port adapter, or router documentation.

For examples of applying a VC class to an ATM interface, see the section "Applying a VC Class Example".

Configuring VC Management

When you configure VC management, you enable the router to detect VC connections and disconnections automatically. This notifies protocols to reroute packets immediately, preventing protocols from waiting for unpredictable and relatively long timeout periods.

You may use operation, administration, and maintenance (OAM) to manage your PVCs, and decide which method is reliable in your particular network.

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

VC management using OAM is referred to as OAM management.

Configuring OAM Management for PVCs

OAM management may be enabled for PVCs. To configure OAM management for an ATM PVC, use the following commands beginning in global configuration mode:

	Command	Purpose

Step 1	`Router(config)# interface atm slot/0[.subinterface-number {multipoint | point-to-point}]`
	
	or
	
	`Router(config)# interface atm slot/port-adapter/0[.subinterface-number {multipoint | point-to-point}]`
	
	or
	
	`Router(config)# Router(config)# interface atm number[.subinterface-number {multipoint | point-to-point}]`
		Specifies the ATM interface using the appropriate format of the **interface atm** command.[1]

Step 2	`Router(config-if)# pvc [name] vpi/vci`	Specifies the ATM PVC.
Step 3	`Router(config-if-atm-vc)# oam-pvc manage [frequency]`	Enables OAM management on the PVC.
Step 4	`Router(config-if-atm-vc)# oam retry up-count down-count retry-frequency`	(Optional) Specifies OAM management parameters for re-establishing and removing a PVC connection.

1. To determine the correct form of the **interface atm** command, consult your ATM network module, port adapter, or router documentation.

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

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

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

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

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

Configuring Classical IP and Inverse ARP in a PVC Environment

The ATM Inverse ARP mechanism is applicable to networks that use PVCs, where connections are established but the network addresses of the remote ends are not known. A server function is *not* used in this mode of operation.

In a PVC environment, the ATM Inverse ARP mechanism is enabled by default for IP and IPX when you use the following commands beginning in global configuration mode:

	Command	Purpose

Step 1	`Router(config)# interface atm slot/0`
	or
	`Router(config)# interface atm slot/port-adapter/0`
	or
	`Router(config)# interface atm number`
		Specifies the ATM interface using the appropriate format of the **interface atm** command.[1]

Step 2	`Router(config-if)# ip address address mask`	Specifies the IP address of the interface.
Step 3	`Router(config-if)# pvc [name] vpi/vci`	Creates a PVC.
Step 4	`Router(config-if-atm-vc)# no shutdown`	Enables the ATM interface.

1. To determine the correct form of the **interface atm** command, consult your ATM network module, port adapter, or router documentation.

Repeat Step 3 for each PVC you want to create.

By default, Inverse ARP datagrams will be sent on this virtual circuit every 15 minutes. To adjust the Inverse ARP time period, use the **inarp** *minutes* command in interface-ATM-VC configuration mode.

Note The ATM ARP mechanism works with IP only. The Inverse ATM ARP mechanism works with IP and IPX only. For all other protocols, the destination address must be specified.

Customizing the ATM Interface

You can customize the ATM interface. The features you can customize have default values that will most likely suit your environment and probably need not be changed. However, you might need to enter configuration commands, depending upon the requirements for your system configuration and the protocols you plan to route on the interface. To customize the ATM interface, perform the tasks in the following sections:

- Configuring MTU Size
- Configuring MTU Size

Configuring MTU Size

Each interface has a default maximum packet size or maximum transmission unit (MTU) size. For ATM interfaces, this number defaults to 4470 bytes. The maximum is 9188 bytes for the AIP and NPM, 17969 for the ATM port adapter, and 17998 for the ATM-CES port adapter. The MTU can be set on a per-sub-interface basis as long as the interface MTU is as large or larger than the largest subinterface MTU.

To set the maximum MTU size, use the following command in interface configuration mode:

Command	Purpose
`Router(config-if)# mtu bytes`	Sets the maximum MTU size.

Monitoring and Maintaining the ATM Interface

After configuring an ATM interface, you can display its status. You can also display the current state of the ATM network and connected virtual circuits. To show current virtual circuits and traffic information, use the following commands in EXEC mode:

Command	Purpose
`Router# show arp`	Displays entries in the ARP table.
`Router# show atm class-links {vpi/vci | name}`	Displays PVC parameter configurations and where the parameter values are inherited from.

`Router# show atm interface atm slot/0`
`Router# show atm interface atm slot/port-adapter/0`
`Router# show atm interface atm number`
	Displays ATM-specific information about the ATM interface using the appropriate format of the **show atm interface atm** command.[1]

`Router# show atm map`	Displays the list of all configured ATM static maps to remote hosts on an ATM network.
`Router# show atm pvc [vpi/vci | name | interface atm interface_number]`	Displays all active ATM PVCs and traffic information.
`Router# show atm traffic`	Displays global traffic information to and from all ATM networks connected to the router, OAM statistics, and a list of counters of all ATM traffic on this router.

Command	Purpose
Router# **show atm vc** [*vcd-number* | [**range** *lower-limit-vcd upper-limit-vcd*] [**interface ATM** *interface-number*] [**detail** [**prefix** {**vpi/vci** | **vcd** | **interface** | **vc_name**}]] [*connection-name*] | **signalling** [**freed-svcs** | [**cast-type** {**p2mp** | **p2p**}] [**detail**] [**interface ATM** *interface-number*]] | **summary ATM** *interface-number*]	Displays all active ATM virtual circuits (PVCs) and traffic information. **Note** The SVCs and the **signalling** keyword are not supported on the Cisco ASR 1000 series routers.
Router# **show interfaces atm** Router# **show interfaces atm** *slot***/0** Router# **show interfaces atm** *slot*/*port-adapter***/0**	Displays statistics for the ATM interface using the appropriate format of the **show interfaces atm** command.
Router# **show network-clocks**	Displays the clock signal sources and priorities that you established on the router.

1. To determine the correct form of the **interface atm** command, consult your ATM network module, port adapter, or router documentation.

ATM Configuration Examples

The examples in the following sections illustrate how to configure ATM for the features described in this chapter. The examples below are presented in the same order as the corresponding configuration task sections:

- Creating a PVC Example
- PVC with AAL5 and LLC/SNAP Encapsulation Examples
- PVCs in a Fully Meshed Network Example
- Enabling Inverse ARP Example
- Configuring Generation of End-to-End F5 OAM Loopback Cells Example
- Configuring PVC Trap Support Example
- Creating a VC Class Example
- Applying a VC Class Example
- OAM Management on an ATM PVC Example

Creating a PVC Example

The following example shows how to create a PVC on an ATM main interface with AAL5/MUX encapsulation configured and a VBR-NRT QOS specified. For further information, refer to the sections "Creating a PVC" and "Configuring PVC Traffic Parameters".

```
interface 2/0
 pvc cisco 1/40
 encapsulation aal5mux ip
 vbr-nrt 100000 50000 20
 exit
```

PVC with AAL5 and LLC/SNAP Encapsulation Examples

The following example shows how to create a PVC 0/50 on ATM interface 3/0. It uses the global default LLC/SNAP encapsulation over AAL5. The interface is at IP address 1.1.1.1 with 1.1.1.5 at the other end of the connection. For further information, refer to the sections "Creating a PVC" and "Mapping a Protocol Address to a PVC".

```
interface atm 3/0
 ip address 1.1.1.1 255.255.255.0
 pvc 0/50
 protocol ip 1.1.1.5 broadcast
 exit
!
 ip route-cache cbus
```

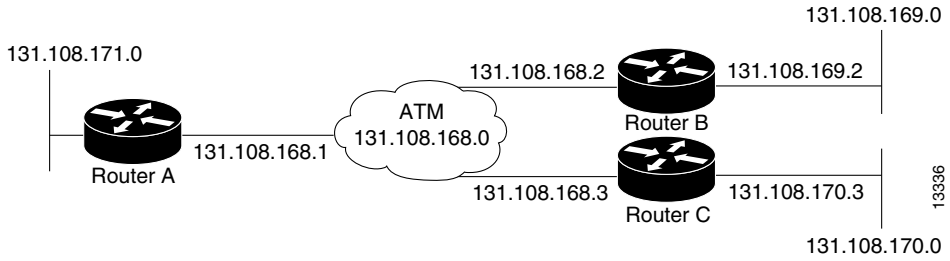
The following example is a typical ATM configuration for a PVC:

```
interface atm 4/0
 ip address 172.21.168.112 255.255.255.0
 atm maxvc 512
 pvc 1/51
 protocol ip 171.21.168.110
 exit
!
 pvc 2/52
 protocol decnet 10.1 broadcast
 exit
!
 pvc 3/53
 protocol clns 47.004.001.0000.0c00.6e26.00 broadcast
 exit
!
 decnet cost 1
 clns router iso-igrp comet
 exit
!
router iso-igrp comet
 net 47.0004.0001.0000.0c00.6666.00
 exit
!
router igrp 109
 network 172.21.0.0
 exit
!
ip domain-name CISCO.COM
```

PVCs in a Fully Meshed Network Example

Figure 1 illustrates a fully meshed network. The configurations for routers A, B, and C follow the figure. In this example, the routers are configured to use PVCs. *Fully meshed* indicates that any workstation can communicate with any other workstation. Note that the two **protocol** statements configured in router A identify the ATM addresses of routers B and C. The two **protocol** statements in router B identify the ATM addresses of routers A and C. The two **protocol** statements in router C identify the ATM addresses of routers A and B. For further information, refer to the sections "Creating a PVC" and "Mapping a Protocol Address to a PVC".

Figure 1 Fully Meshed ATM Configuration Example



Router A

```
ip routing
!
interface atm 4/0
 ip address 131.108.168.1 255.255.255.0
 pvc 0/32
 protocol ip 131.108.168.2 broadcast
 exit
!
 pvc 0/33
 protocol ip 131.108.168.3 broadcast
 exit
```

Router B

```
ip routing
!
interface atm 2/0
 ip address 131.108.168.2 255.255.255.0
 pvc test-b-1 0/32
 protocol ip 131.108.168.1 broadcast
 exit
!
 pvc test-b-2 0/34
 protocol ip 131.108.168.3 broadcast
 exit
```

Router C

```
ip routing
!
interface atm 4/0
 ip address 131.108.168.3 255.255.255.0
 pvc 0/33
 protocol ip 131.108.168.1 broadcast
 exit
!
 pvc 0/34
 protocol ip 131.108.168.2 broadcast
 exit
```

Enabling Inverse ARP Example

The following example shows how to enable Inverse ARP on an ATM interface and specifies an Inverse ARP time period of 10 minutes. For further information, refer to the section "Enabling Inverse ARP".

```
interface atm 2/0
```

```
 pvc 1/32
 inarp 10
 exit
```

Enabling Access Node Control Protocol on ATM Interfaces Example

The following example shows how to enable ANCP on an ATM subinterface. In the example, ANCP is enabled on ATM subinterface 2/0/1.1.

```
interface ATM2/0/0.1 point-to-point
          description ANCP Link to one DSLAM
          no ip mroute-cache
          ip address 192.168.0.2 255.255.255.252
          pvc 254/32
                protocol ip 192.168.0.1
                ancp enable
                no snmp trap link-status
```

Configuring Generation of End-to-End F5 OAM Loopback Cells Example

The following example shows how to enable OAM management on an ATM PVC. The PVC is assigned the name routerA and the VPI and VCI are 0 and 32, respectively. OAM management is enabled with a frequency of 3 seconds between OAM cell transmissions. For further information, refer to the section "Enabling Access Node Control Protocol (ANCP) on an ATM Interface".

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

Configuring PVC Trap Support Example

The following example shows how to configure PVC trap support on your Cisco router:

```
!For PVC trap support to work on your router, you must first have SNMP support and
!an IP routing protocol configured on your router:
Router(config)# snmp-server community public ro
Router(config)# snmp-server host 171.69.61.90 public
Router(config)# ip routing
Router(config)# router igrp 109
Router(config-router)# network 172.21.0.0
!
!Enable PVC trap support and OAM management:
Router(config)# snmp-server enable traps atm pvc interval 40 fail-interval 10
Router(config)# interface atm 1/0.1
Router(config-if)# pvc 0/1
Router(config-if-atm-vc)# oam-pvc manage
!
! Now if PVC 0/1 goes down, host 171.69.61.90 will receive traps.
```

For further information, refer to the "Configuring PVC Trap Support" section.

Creating a VC Class Example

The following example shows how to create a VC class named main and how to configure UBR and encapsulation parameters. For further information, refer to the sections "Creating a VC Class" and "Configuring VC Parameters".

```
vc-class atm main
 ubr 10000
 encapsulation aal5mux ip
```

The following example shows how to create a VC class named sub and how to configure UBR and PVC management parameters. For further information, refer to the sections "Creating a VC Class" and "Configuring VC Parameters".

```
vc-class atm sub
 ubr 15000
 oam-pvc manage 3
```

The following example shows how to create a VC class named pvc and how to configure VBR-NRT and encapsulation parameters. For further information, refer to the sections "Creating a VC Class" and "Configuring VC Parameters".

```
vc-class atm pvc
 vbr-nrt 10000 5000 64
 encapsulation aal5snap
```

Applying a VC Class Example

The following example shows how to apply the VC class named main to the ATM main interface 4/0. For further information, refer to the section "Applying a VC Class".

```
interface atm 4/0
 class-int main
 exit
```

The following example shows how to apply the VC class named sub to the ATM subinterface 4/0.5:

```
interface atm 4/0.5 multipoint
 class-int sub
 exit
```

The following example shows how to apply the VC class named pvc directly on the PVC 0/56:

```
interface atm 4/0.5 multipoint
 pvc 0/56
 class-vc pvc
 exit
```

OAM Management on an ATM PVC Example

The following example shows how to enable OAM management on an ATM PVC. The PVC is assigned the name routerA and the VPI and VCI are 0 and 32, respectively. OAM management is enabled with a frequency of 3 seconds between OAM cell transmissions. For further information, refer to the section "Configuring OAM Management for PVCs".

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

```
!
interface atm 4/0.1 point-to-point
 pvc 0/35
 exit
```

No **map-group** and **map-list** commands are needed for IP.

```
interface atm 4/0
 ip address 1.1.1.1 255.0.0.0
 pvc 1/33
 pvc 1/34
 pvc 1/35
 bridge-group 1
!
bridge 1 protocol dec
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	*Cisco IOS Master Commands List, All Releases*
ATM commands	*Cisco IOS Asynchronous Transfer Mode Command Reference*
ATM SPAs	*"Overview of ATM SPAs"* in the *Cisco ASR 1000 Series Aggregation Services Routers SIP and SPA Software Configuration Guide*
Configuring IP to ATM class of service (CoS)	• *IP to ATM CoS Overview* • *Configuring IP to ATM CoS*
Configuring PPP over Ethernet (PPPoE) over ATM	*Configuring PPPoE over ATM*

Standards

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

MIBs

MIB	MIBs Link
• Cisco PVC trap MIB - CISCO-IETF-ATM2-PVCTRAP-MIB	To locate and download MIBs for selected platforms, Cisco IOS XE software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

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

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/techsupport

Feature Information for Configuring ATM

Table 1 lists the features in this module and provides links to specific configuration information.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS XE software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note Table 1 lists only the Cisco IOS XE software release that introduced support for a given feature in a given Cisco IOS XE software release train. Unless noted otherwise, subsequent releases of that Cisco IOS XE software release train also support that feature.

Table 1 Feature Information for Configuring ATM

Feature Name	Releases	Feature Information
Configuring ATM, ATM Sub-interface Multipoint Enabling ANCP on ATM interfaces	Cisco IOS Release 2.5.0	ATM supports two types of interfaces: point-to-point and multipoint. • Point-to-point subinterface—With point-to-point subinterfaces, each pair of routers has its own subnet. If you put the PVC on a point-to-point subinterface, the router assumes that there is only one point-to-point PVC configured on the subinterface. Therefore, any IP packets with a destination IP address in the same subnet are forwarded on this virtual circuit (VC). This is the simplest way to configure the mapping and is therefore the recommended method. • Multipoint networks—Multipoint networks have three or more routers in the same subnet. If you put the PVC in a point-to-multipoint subinterface or in the main interface (which is multipoint by default), you need to either configure a static mapping or enable inverse Address Resolution Protocol (ARP) for dynamic mapping. ANCP needs to be enabled on ATM interface when message is sent from the DSLAM. The following commands were introduced or modified: **pvc**, **protocol**, **cbr**, **ubr**, **encapsulation aal5snap**, **interface atm**, **ip address**, **inarp**, **oam-pvc manage**, **oam-retry**, **class-vc**, **snmp-server enable traps**, **vc-class atm**, **class-int**, **mtu**, **show atm class-links**, **show atm interface atm**, **show atm map**, **show atm pvc**, **show atm traffic**, **show atm vc**, **show network-clocks**, **ancp enable**, **ancp neighbor.**

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