Cisco IOS Asynchronous Transfer Mode Command Reference

Release 12.4T

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Text Part Number: OL-7920-01

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Introduction

This document describes the commands used to configure ATM features with Cisco IOS software. ATM commands are used to configure ATM interfaces and to configure serial interfaces for ATM access. For ATM configuration information and examples, refer to the "Configuring ATM" section of the *Cisco IOS Wide-Area Networking Configuration Guide*.

Prior to Cisco IOS Release 12.3(14)T, the commands for configuring ATM features were presented in separate command reference books:

- The commands for configuring LAN ATM features were presented in the *Cisco IOS Switching Services Command Reference.*
- The commands for configuring WAN ATM features were presented in the *Cisco IOS Wide-Area Networking Command Reference*.

For information about configuration, refer to the *Cisco IOS Asynchronous Transfer Mode Configuration Guide*, Release 12.4.

Cisco IOS ATM Commands

This chapter presents the Cisco IOS ATM commands.

abr

To select available bit rate (ABR) quality of service (QoS) and configure the output peak cell rate and output minimum guaranteed cell rate for an ATM permanent virtual circuit (PVC) or virtual circuit (VC) class, use the **abr** command in the appropriate command mode. To remove the ABR parameters, use the **no** form of this command.

abr *output-pcr output-mcr*

no abr *output-pcr output-mcr*

Syntax Description

output-pcr	The output peak cell rate, in kilobits per second.
output-mcr	The output minimum guaranteed cell rate, in kilobits per second.

Defaults

ABR QoS at the maximum line rate of the physical interface.

Command Modes

Interface-ATM-VC configuration (for an ATM PVC)
VC-class configuration (for a VC class)
PVC range configuration (for an ATM PVC range)
PVC-in-range configuration (for an individual PVC within a PVC range)

Command History

Release	Modification
11.1	This command was introduced.
12.1(5)T	This command was modified to be available in PVC range and PVC-in-range configuration modes.

Usage Guidelines

If the **abr** command is not explicitly configured on an ATM PVC, the VC inherits the following default configuration (listed in order of precedence):

- Configuration of any QoS command (**abr**, **ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC itself.
- Configuration of any QoS command (**abr**, **ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC's ATM subinterface.
- Configuration of any QoS command (**abr**, **ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC's ATM main interface.
- Global default value: ABR QoS at the maximum line rate of the PVC.

ABR is a quality of service class defined by the ATM Forum for ATM networks. ABR is used for connections that do not require timing relationships between source and destination. ABR provides no guarantees in terms of cell loss or delay, providing only best-effort service. Traffic sources adjust their transmission rate in response to information they receive describing the status of the network and its capability to successfully deliver data.

In ABR transmission, the peak cell rate (PCR) specifies the maximum value of the allowed cell rate (ACR), and minimum cell rate (MCR) specifies the minimum value for the ACR. ACR varies between the MCR and the PCR and is dynamically controlled using congestion control mechanisms.

Examples

The following example specifies the *output-pcr* argument to be 100,000 kbps and the *output-mcr* argument to be 3000 kbps for an ATM PVC:

```
pvc 1/32
 abr 100000 3000
```

Related Commands

Command	Description
ubr	Configures UBR QoS and specifies the output peak cell rate for an ATM PVC, SVC, VC class, or VC bundle member.
ubr+	Configures UBR QoS and specifies the output peak cell rate and output minimum guaranteed cell rate for an ATM PVC, SVC, VC class or VC bundle member.
vbr-nrt	Configures the VBR-NRT QoS and specifies output peak cell rate, output sustainable cell rate, and output maximum burst cell size for an ATM PVC, SVC, or VC class.

atm aal aal3/4

To enable support for ATM adaptation layer 3/4 (AAL3/4) on an ATM interface, use the **atm aal aal3/4** command in interface configuration mode. To disable support for AAL3/4 on an ATM interface, use the **no** form of this command.

atm aal aal3/4

no atm aal aal3/4

Syntax Description

This command has no arguments or keywords.

Defaults

Support for AAL3/4 is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced.

Usage Guidelines

This command is supported on Cisco 7500 series routers with ATM Interface Processor (AIP). This command is not supported on the ATM port adapter. Because Cisco 4500 and Cisco 4700 routers always support both AAL3/4 and AAL5, this command is not required on Cisco 4500 and Cisco 4700 routers.

Only one virtual circuit can exist on a subinterface that is being used for AAL3/4 processing, and that virtual circuit must be an AAL3/4 virtual circuit.

The AAL3/4 support feature requires static mapping of all protocols except IP.

Examples

The following example enables AAL3/4 on ATM interface 2/0:

```
interface atm2/0
 ip address 172.21.177.178 255.255.255.0
 atm aal aal3/4
```

Related Commands

Command	Description
atm mid-per-vc	Limits the number of MID numbers allowed on each VC.
atm multicast	Assigns an SMDS E.164 multicast address to the ATM subinterface that supports AAL3/4 and SMDS encapsulation.
atm smds-address	Assigns a unicast E.164 address to the ATM subinterface that supports AAL3/4 and SMDS encapsulation.
pvc	Creates or assigns a name to an ATM PVC, specifies the encapsulation type on an ATM PVC, or enters interface-ATM-VC configuration mode.

atm abr rate-factor

To configure the amount by which the cell transmission rate increases or decreases in response to flow control information from the network or destination for available bit rate (ABR) virtual circuits (VCs), use the **atm abr rate-factor** command in interface configuration mode. To return to the default, use the **no** form of this command.

atm abr rate-factor [*rate-increase-factor*] [*rate-decrease-factor*]

no atm abr rate-factor [*rate-increase-factor*] [*rate-decrease-factor*]

Syntax Description

rate-increase-factor	(Optional) Factor by which to increase the data rate. The rate increase factor is specified in powers of 2 from 1 to 32768.
rate-decrease-factor	(Optional) Factor by which to decrease the data rate. The rate decrease factor is specified in powers of 2 from 1 to 32768.

Defaults

ABR rate increase and decrease factor is 16.

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

To configure an ABR VC, use the **pvc** command with the **abr** keyword.

To verify the ABR rate factor, use the **show atm interface atm** EXEC command.

Examples

The following example sets the ABR rate factor to 32 for the next cell transferred on ATM interface 4/0:

```
interface atm 4/0
 atm abr rate-factor 32 32
```

Related Commands

Command	Description
pvc	Configures the PVC interface.
show atm interface atm	Displays ATM-specific information about an ATM interface.

atm-address

To override the control ATM address of a Multiprotocol over ATM client (MPC) or a Multiprotocol over ATM server (MPS), use the **atm-address** command in interface configuration mode. To revert to the default address, use the **no** form of this command.

atm-address *atm-address*

no atm-address

Syntax Description

atm-address	Control ATM address.

Defaults

The default is an automatically generated ATM address.

Command Modes

Interface configuration

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Usage Guidelines

This command specifies the control ATM address that an MPC or MPS should use when it comes up if it is associated with a hardware interface.

The **atm-address** command overrides the default operational control address of the MPC or MPS. When this address is deleted (using the **no** form of the command), the MPC or MPS uses an automatically generated address as its control address.

Examples

The following example shows how to specify the ATM address for an MPC:

```
Router(config-if)# atm-address 47.009181000000061705b7701.00400BFF0011.00
```

The following example shows how to specify the ATM address for an MPS:

```
Router(config-if)# atm-address 47.009181000000061705C2B01.00E034553024.00
```

atm address-registration

To enable the router to engage in address registration and callback functions with the Interim Local Management Interface (ILMI), use the **atm address-registration** command in interface configuration mode. To disable ILMI address registration functions, use the **no** form of this command.

atm address-registration

no atm address-registration

Syntax Description

This command has no arguments or keywords.

Defaults

Enabled

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

This command enables a router to register its address with the ILMI for callback when specific events occur, such as incoming Simple Network Management Protocol (SNMP) traps or incoming new network prefixes.

Examples

The following example enables ATM interface 1/0 to register its address:

```
interface atm 1/0
 atm address-registration
```

Related Commands

Command	Description
atm ilmi-keepalive	Enables ILMI keepalives.

atm arp-server

To identify an ATM Address Resolution Protocol (ARP) server for the IP network or set time-to-live (TTL) values for entries in the ATM ARP table, use the **atm arp-server** command in interface configuration mode. To remove the definition of an ATM ARP server, use the **no** form of this command.

atm arp-server [**self** | **nsap** *nsap-address*] [**time-out** *minutes*]

no atm arp-server [**self** [**time-out** *minutes*] | [**nsap** *nsap-address*]]

Syntax Description

self	(Optional) Specifies the current router as the ATM ARP server.
time-out *minutes*	(Optional) Number of minutes for which a destination entry listed in the ATM ARP server's ARP table will be kept before the server takes any action to verify or time out the entry.
nsap *nsap-address*	(Optional) Network service access point (NSAP) address of an ATM ARP server.

Defaults

The default timeout value is 20 minutes.

The ARP server process is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

If an NSAP address is specified, the ARP client on this interface uses the specified host as an ARP server. You can specify multiple ATM ARP servers by repeating the command. If **self** is specified, this interface acts as the ARP server for the logical IP network.

The ATM ARP server takes one of the following actions if a destination listed in the server's ARP table expires:

- If a virtual circuit still exists to that destination, the server sends an Inverse ARP request. If no response arrives, the entry times out.
- If a virtual circuit does not exist to the destination, the entry times out immediately.

This implementation follows RFC 1577, *Classical IP over ATM*.

To configure redundant ARP servers, you must first enable redundant ARP server support by entering the **atm classic-ip-extensions** command with the **BFI** keyword.

Examples

The following example configures ATM on an interface and configures the interface to function as the ATM ARP server for the IP subnetwork:

```
interface atm 0/0
 ip address 10.0.0.1.255.0.0.0
atm nsap-address ac.1533.66.020000.0000.0000.0000.0000.0000.0000.00
atm rate-queue 1 100
atm maxvc 1024
atm pvc 1 0 5 qsaal
atm arp-server self
```

Related Commands

Command	Description
atm classic-ip-extensions	Enables support for redundant ATM ARP servers on a single LIS.

atm classic-ip-extensions

To enable support for redundant ATM Address Resolution Protocol (ARP) servers on a single logical IP subnetwork (LIS), use the **atm classic-ip-extensions** command in interface configuration mode. To remove support for redundant ATM ARP servers, use the **no** form of this command.

atm classic-ip-extensions {**BFI** | **none**}

no atm classic-ip-extensions

Syntax Description

BFI	Enables simple redundant ARP server support. BFI as an acronym is undefined.
none	Enables standard RFC 1577 behavior (no redundant ARP server support).

Defaults

Redundant ATM ARP server support is not enabled.

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Cisco's implementation of the ATM ARP server supports redundant ATM ARP servers on a single logical IP subnetwork (LIS). In order for redundant ATM ARP server support to work, all of the devices on the LIS must be Cisco devices and must have the **atm classic-ip-extensions BFI** command configured.

The **none** keyword enables behavior that complies with RFC 1577, *Classical IP over ATM*. RFC 1577 does not support redundant ARP servers.

Examples

The following example shows how to configure redundant ARP servers on an ATM interface:

```
Router(config)# interface atm 1/0
Router(config-if)# atm classic-ip-extensions BFI
Router(config-if)# atm arp-server nsap 47.000580FFE1000000F21A3167.666666666666.00
Router(config-if)# atm arp-server nsap 47.000580FFE1000000F21A3167.555555555555.00
```

Related Commands

Command	Description
atm arp-server	Identifies an ATM Address Resolution Protocol (ARP) server for the IP network or sets TTL values for entries in the ATM ARP table.

atm clock internal

To cause the ATM interface to generate the transmit clock internally, use the **atm clock internal** command in interface configuration mode. To restore the default value, use the **no** form of this command.

atm clock internal

no atm clock internal

Syntax Description

This command has no arguments or keywords.

Defaults

The ATM interface uses the transmit clock signal from the remote connection (the line). The switch provides the clocking.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

This command is meaningless on a 4B/5B physical layer interface module (PLIM).

For SONET interfaces, use the **atm clock internal** command to configure an ATM port adapter to supply its internal clock to the line.

Examples

The following example causes the ATM interface to generate the transmit clock internally:

```
interface atm 4/0
 atm clock internal
```

atm compression

To specify the software compression mode on an interface, use the **atm compression** command in interface configuration mode. To remove the compression mode setting, use the **no** form of this command.

atm compression {**per-packet** | **per-interface** | **per-vc**}

no atm compression {**per-packet** | **per-interface** | **per-vc**}

Syntax Description

per-packet	Specifies packet-by-packet compression mode (no history). This is the default.
per-interface	Specifies one context per interface (with history).
per-vc	Specifies one context for every virtual circuit (with history).

Defaults

per-packet

Command Modes

Interface configuration

Command History

Release	Modification
11.3(1)MA	This command was introduced on the Cisco MC3810 multiservice concentrator.

Usage Guidelines

This command applies to ATM configuration on the Cisco MC3810 multiservice concentrator.

Examples

The following example configures per-packet ATM compression:

```
interface atm0
 atm compression per-packet
```

atm ds3-scramble

To enable scrambling of the ATM cell payload for the DS3 physical layer interface module (PLIM) on an ATM interface, use the **atm ds3-scramble** command in interface configuration mode. To disable scrambling of the ATM cell payload for the DS3 PLIM, use the **no** form of this command.

atm ds3-scramble

no atm ds3-scramble

Syntax Description

This command has no arguments or keywords.

Defaults

DS3 scrambling is not enabled.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.
11.1	Command syntax was changed from **ds3 scramble** to **atm ds3-scramble**.

Usage Guidelines

DS3 scrambling is used to assist clock recovery on the receiving end.

Examples

The following example disables DS3 scrambling on the interface:

```
interface atm 4/0
 no atm ds3-scramble
```

atm e164 auto-conversion

To enable ATM E164 autoconversion, use the **atm e164 auto-conversion** command in interface configuration mode. To disable autoconversion, use the **no** form of this command.

atm e164 auto-conversion

no atm e164 auto-conversion

Syntax Description

This command has no arguments or keywords.

Defaults

E.164 auto conversion is not enabled.

Command Modes

Interface configuration

Command History

Release	Modification
11.3	This command was introduced.

Usage Guidelines

You must enable the ATM interface before using the **atm e164 auto-conversion** command.

When an interface is configured for E.164 auto conversion, ATM E.164 format addresses are converted to the corresponding native E.164 address for outgoing calls. For incoming calls, native E.164 addresses are converted to the corresponding ATM E.164 format.

Examples

The following example enables E.164 auto conversion on ATM interface 0/0/1:

```
interface atm 0/0/1
 atm e164 auto-conversion
```

atm e3-scramble

To enable scrambling of the ATM cell payload for the E3 physical layer interface module (PLIM) on an ATM interface, use the **atm e3-scramble** command in interface configuration mode. To disable scrambling of the ATM cell payload for the E3 PLIM, use the **no** form of this command.

atm e3-scramble

no atm e3-scramble

Syntax Description

This command has no arguments or keywords.

Defaults

E3 scrambling is enabled.

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

E3 scrambling is used to assist clock recovery on the receiving end.

Examples

The following example disables E3 scrambling on the interface:

```
interface atm 2/0
 no atm e3-scramble
```

atm esi-address

To enter the end station ID (ESI) and selector byte fields of the ATM network service access point (NSAP) address, use the **atm esi-address** command in interface configuration mode. The NSAP address prefix is filled in via Integrated Local Management Interface (ILMI) from the ATM switch. To delete the end station address, use the **no** form of this command.

atm esi-address *esi***.***selector*

no atm esi-address *esi***.***selector*

Syntax Description

esi	End station ID field value in hexadecimal; 6 bytes long.
.*selector*	Selector field value in hexadecimal; 1 byte long. Dot is required as a separator.

Defaults

No ESI is defined.

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

The **atm esi-address** command allows you to configure the ATM address by entering the ESI (12 hexadecimal characters) and the selector byte (2 hexadecimal characters). The ATM prefix (26 hexadecimal characters) will be provided by the ATM switch. To get the prefix from the ATM switch, the ILMI permanent virtual circuit (PVC) must be configured on the router and the ATM switch must be able to supply a prefix via ILMI. A period must be used to separate the *esi* from the *selector* arguments.

Note When ILMI is configured, use the **atm esi-address** command instead of the **atm nsap-address** command. The **atm esi-address** and **atm nsap-address** commands are mutually exclusive. Configuring the router with the **atm esi-address** command negates the **atm nsap-address** setting, and vice versa.

The ILMI PVC must be configured in order to get an NSAP address prefix from the switch.

Examples

The following example sets up the ILMI PVC and assigns the ESI and selector field values on the ATM interface 4/0:

```
interface atm 4/0
 atm pvc 2 0 16 ilmi
 atm esi-address 345678901234.12
```

Related Commands

Command	Description
atm nsap-address	Sets the NSAP address for an ATM interface using SVC mode.
ilmi manage	Enables ILMI management on an ATM PVC.
pvc	Configures the PVC interface.

atm exception-queue

To set the exception queue length, use the **atm exception-queue** command in interface configuration mode. To restore the default value, use the **no** form of this command.

atm exception-queue *number*

no atm exception-queue

Syntax Description

number	Number of entries. Range is from 8 to 256. Default is 32.

Defaults

32 entries

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

This command is supported on ATM interface processor (AIP) for Cisco 7500 series routers. This command is not supported on the ATM port adapter for Cisco 7200 and 7500 series routers, nor is it supported on Cisco 4500 and Cisco 4700 routers.

The exception queue is used for reporting ATM events, such as cycle redundancy check (CRC) errors.

Examples

The following example sets the exception queue to 50 entries:

```
atm exception-queue 50
```

atm framing (DS3)

To specify digital signal level 3 (DS3) line framing on an ATM interface, use the **atm framing** command in interface configuration mode. To return to the default C-bit with Physical Layer Convergence Protocol (PLCP) framing, use the **no** form of this command.

atm framing [**cbitadm** | **cbitplcp** | **m23adm** | **m23plcp**]

no atm framing [**cbitadm** | **cbitplcp** | **m23adm** | **m23plcp**]

Syntax Description

cbitadm	(Optional) Specifies C-bit with ATM direct mapping (ADM).
cbitplcp	(Optional) Specifies C-bit with PLCP framing.
m23adm	(Optional) Specifies M23 ATM direct mapping.
m23plcp	(Optional) Specifies M23 with PLCP framing.

Defaults

cbitplcp

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.
11.1	This command was modified to include the Cisco 7200 series routers with the ATM-CES port adapter.

Usage Guidelines

This command is available on Cisco 4500 and 4700 routers with DS3 access speeds, Cisco 7200 series routers, and Cisco 7500 series routers.

Framing on the interface must match that on the switch for this ATM link.

Examples

The following example specifies M23 ADM framing on a router that has been set up with DS3 access to an ATM network:

```
interface atm 4/0
 atm framing m23adm
```

atm framing (E3)

To specify E3 line framing, use the **atm framing** command in interface configuration mode. To return to the default G.751 Physical Layer Convergence Protocol (PLCP) framing, use the **no** form of this command.

atm framing [**g751adm** | **g832adm** | **g751plcp**]

no atm framing [**g751adm** | **g832adm** | **g751plcp**]

Syntax Description

g751adm	(Optional) Specifies G.751 ATM direct mapping (ADM).
g832adm	(Optional) Specifies G.832 ATM direct mapping.
g751plcp	(Optional) Specifies G.751 PLCP encapsulation.

Defaults

g751plcp

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.
11.1	The **g751plcp** keyword was added, together with information on the Cisco 7200 series router with the ATM-CES port adapter.

Usage Guidelines

The default framing is described in the ITU-T Recommendation G.751.

Framing on the interface must match that on the switch for this ATM link.

Examples

The following example specifies G.832 ADM framing on a router that has been set up with E3 access to an ATM network:

```
interface atm 4/0
 atm framing g832adm
```

atm ilmi-keepalive

To enable Interim Local Management Interface (ILMI) keepalives, use the **atm ilmi-keepalive** command in interface configuration mode. To disable ILMI keepalives, use the **no** form of this command.

atm ilmi-keepalive [*seconds*]

no atm ilmi-keepalive [*seconds*]

Syntax Description

seconds	(Optional) Number of seconds between keepalives. Values less than 3 seconds are rounded up to 3 seconds, and there is no upper limit.

Defaults

3 seconds

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Examples

The following example enables ILMI keepalives for the ATM interface 1/0:

```
interface atm 1/0
 atm address-registration
 atm ilmi-keepalive
```

Related Commands

Command	Description
atm address-registration	Enables the router to engage in address registration and callback functions with the ILMI.

atm ilmi-pvc-discovery

To enable ATM permanent virtual circuit (PVC) discovery, use the **atm ilmi-pvc-discovery** command in interface configuration mode. To disable PVC discovery, use the **no** form of this command.

atm ilmi-pvc-discovery [**subinterface**]

no atm ilmi-pvc-discovery [**subinterface**]

Syntax Description

subinterface	(Optional) Causes discovered PVCs to be assigned to the ATM subinterface whose number matches the discovered PVC's VPI number.

Defaults

PVC discovery is not enabled.

Command Modes

Interface configuration

Command History

Release	Modification
11.3	This command was introduced.

Examples

The following example enables PVC discovery on the ATM main interface 2/0. The **subinterface** keyword is used so that all discovered PVCs with a VPI value of 1 will be assigned to the subinterface 2/0.1:

```
interface atm 2/0
 pvc RouterA 0/16 ilmi
 exit
 atm ilmi-pvc-discovery subinterface
 exit

interface atm 2/0.1 multipoint
 ip address 172.21.51.5 255.255.255.0
```

atm lbo

To specify the cable length (line build-out) for the ATM interface, use the **atm lbo** command in interface configuration mode. To return to the default, use the **no** form of this command.

atm lbo {**long** | **short**}

no atm lbo

Syntax Description

long	Specifies a cable length greater than 50 feet.
short	Specifies a cable length up to 50 feet.

Defaults

short

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Examples

The following example specifies that the ATM interface uses a cable of up to 50 feet in length:

```
interface atm 4/0
 atm lbo short
```

Related Commands

Command	Description
ces	Configures cable length for the CBR interface.

atm max-channels

To configure the number of transmit channels for the interface, use the **atm max-channels** command in interface configuration mode. To return to the default, use the **no** form of this command.

atm max-channels *number*

no atm max-channels

Syntax Description

number	Maximum number of transmit channels for the interface. The range is from 64 to 2048 channels. The default is 64 channels.

Defaults

64 channels

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

The **atm max-channels** command replaces the **atm tx-channels** command.

Transmit Descriptors

The **atm max-channels** command can be used to divide the available number (fixed) of transmit descriptors across the configured number of transmit channels. Typically, you think of a one-to-one association between a transmit channel and a VC; however, the ATM-CES port adapter supports other types of VCs than data VCs (for example CES VCs). Also, the ATM-CES port adapter can multiplex one or more VCs over a single virtual path (VP) that is shaped, and the VP only requires a single transmit channel. Therefore, the term *transmit channel* is used rather than *virtual circuit*.

Maximum Burst

The maximum burst of packets that are allowed per VC is limited by the number of transmit descriptors allocated per VC. Because the total number of transmit descriptors available is limited by the available SRAM space, configuration of the number of transmit channels for the interface determines the number of transmit descriptors for each transmit channel. Hence the burst size for each transmit channel is determined by the **atm max-channels** command. For example, for 64 (the default) transmit channels for the interface, 255 transmit descriptors are associated per channel, and for 512 transmit channels for the interface, 31 transmit descriptors are associated per channel.

To display information about the transmit descriptors, use the **show atm interface atm** command.

Examples

The following example sets the number of transmit descriptors for the interface to 120.

```
interface atm 2/0
 atm max-channels 120
```

Related Commands

Command	Description
show atm interface atm	Displays ATM-specific information about an ATM interface.

atm maxvc

To set the ceiling value of the virtual circuit descriptor (VCD) on the ATM interface, use the **atm maxvc** command in interface configuration mode. To restore the default value, use the **no** form of this command.

atm maxvc *number*

no atm maxvc

Syntax Description

number	Maximum number of supported virtual circuits. Valid values are 256, 512, 1024, and 2048.

Defaults

2048 virtual circuits

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

This command is supported on Cisco 7500 series routers; it is not supported on the Cisco 4500 and Cisco 4700 routers, which have a fixed maximum of 1024 VCs.

This command sets the maximum value supported for the *vcd* argument in the **atm pvc** command. It also determines the maximum number of virtual circuits on which the AIP allows segmentation and reassembly (SAR) to occur. However, if you set a **maxvc** limit and then enter the **atm pvc** command with a larger value for the *vcd* argument, the software does not generate an error message.

This command does not affect the virtual path identifier (VPI)-virtual channel identifier (VCI) pair of each virtual circuit.

Examples

The following example sets a ceiling VCD value of 1024 and restricts the AIP to supporting no more than 1024 virtual circuits:

```
atm maxvc 1024
```

Related Commands

Command	Description
pvc	Configures an ATM PVC.

atm mid-per-vc

To limit the number of message identifier (MID) numbers allowed on each virtual circuit, use the **atm mid-per-vc** command in interface configuration mode.

atm mid-per-vc *maximum*

Syntax Description

maximum	Number of MIDs allowed per virtual circuit on this interface. The values allowed are 16, 32, 64, 128, 256, 512, and 1024.

Defaults

16 MIDs per virtual circuit.

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced.

Usage Guidelines

This command is supported on Cisco 7200 and 7500 series routers.

MID numbers are used by receiving devices to reassemble cells from multiple sources into packets.

This command limits the number of discrete messages allowed on the PVC at the same time. It does not limit the number of cells associated with each message.

The *maximum* set by the **atm mid-per-vc** command overrides the range between the *midhigh* and *midlow* values set by the **atm pvc** command. If you set a *maximum* of 16 but a *midlow* of 0 and a *midhigh* of 255, only 16 MIDs (not 256) are allowed on the virtual circuit.

Examples

The following example allows 64 MIDs per ATM virtual circuit:

```
atm mid-per-vc 64
```

Related Commands

Command	Description
pvc	Configures the PVC interface.

atm multicast

To assign a Switched Multimegabit Data Service (SMDS) E.164 multicast address to the ATM subinterface that supports ATM adaptation layer 3/4 (AAL3/4) and SMDS encapsulation, use the **atm multicast** command in interface configuration mode.

atm multicast *address*

Syntax Description

address	Multicast E.164 address assigned to the subinterface.

Defaults

No multicast E.164 address is defined.

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced.

Usage Guidelines

This command is supported on Cisco 7500 series, Cisco 4500, and Cisco 4700 routers. This command is not supported on the ATM port adapter.

Each AAL3/4 subinterface is allowed only one multicast E.164 address. This multicast address is used for all protocol broadcast operations.

Examples

The following example assigns a multicast E.164 address to the ATM subinterface that is being configured:

```
atm multicast e180.0999.000
```

Related Commands

Command	Description
abr	Selects ABR QoS and configures output peak cell rate and output minimum guaranteed cell rate for an ATM PVC or VC class.
atm smds-address	Assigns a unicast E.164 address to the ATM subinterface that supports AAL3/4 and SMDS encapsulation.
pvc	Configures the PVC interface.

atm multipoint-interval

To specify how often new destinations can be added to multipoint calls to an ATM switch in the network, use the **atm multipoint-interval** command in interface configuration mode. To return to the default interval, use the **no** form of this command.

atm multipoint-interval *interval*

no atm multipoint-interval *interval*

Syntax Description

interval	Interval length, in seconds. Range is from 0 to 4294967. Default is 30.

Defaults

30 seconds

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

This command applies to switched virtual circuits (SVCs) only, not to permanent virtual circuits (PVCs).

This command has no effect unless ATM multipoint signaling is enabled on the interface.

Examples

The following example enables point-to-multipoint signaling on the ATM interface 2/0. It also specifies that new destinations can be added to multipoint calls every 60 seconds:

```
interface atm 2/0
 atm multipoint-signalling
 atm multipoint-interval 60
```

Related Commands

Command	Description
atm multipoint-signalling	Enables point-to-multipoint signaling to the ATM switch.

atm multipoint-signalling

To enable point-to-multipoint signaling to the ATM switch, use the **atm multipoint-signalling** command in interface configuration mode. To disable point-to-multipoint signalling to the ATM switch, use the **no** form of this command.

atm multipoint-signalling

no atm multipoint-signalling

Syntax Description

This command has no arguments or keywords.

Defaults

Point-to-multipoint signaling is not enabled.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.
11.1	Functionality was changed to allow this command on all subinterfaces, not just the main interface.

Usage Guidelines

If multipoint signaling is enabled, the router uses existing static map entries that have the **broadcast** keyword set to establish multipoint calls. One call is established for each logical subnet of each protocol.

All destinations are added to the call. One multicast packet is sent to the ATM switch for each multipoint call. The ATM switch replicates the packet to all destinations.

The **atm multipoint-interval** command determines how often new destinations can be added to a multipoint call.

Note Prior to Cisco IOS Release 11.1, when this command was used on the main interface, it also affected all subinterfaces. For Release 11.1 and later, explicit configuration on each subinterface is required to obtain the same functionality.

Examples

The following example enables point-to-multipoint signalling on the ATM interface 2/0:

```
interface atm 2/0
 atm multipoint-signalling
```

Related Commands

Command	Description
atm multipoint-interval	Specifies how often new destinations can be added to multipoint calls to an ATM switch in the network.

atm nsap-address

To set the network service access point (NSAP) address for an ATM interface using switched virtual circuit (SVC) mode, use the **atm nsap-address** command in interface configuration mode. To remove any configured address for the interface, use the **no** form of this command.

atm nsap-address *nsap-address*

no atm nsap-address

Syntax Description

nsap-address	The 40-digit hexadecimal NSAP address of this interface (the source address).

Defaults

No NSAP address is defined for this interface.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

When configuring an SVC, you must use the **atm nsap-address** command to define the source NSAP address. It identifies a particular port on the ATM network and must be unique across the network.

Note When the Integrated Local Management Interface (ILMI) is configured, use the **atm esi-address** command instead of the **atm nsap-address** command. The **atm esi-address** and **atm nsap-address** commands are mutually exclusive. Configuring the router with the **atm esi-address** command negates the **atm nsap-address** setting, and vice versa.

Configuring a new address on the interface overwrites the previous address. The router considers the address as a string of bytes and will not prefix or suffix the address with any other strings or digits. The complete NSAP address must be specified, because this value is used in the Calling Party Address Information Element in the SETUP message to establish a virtual circuit.

ATM NSAP addresses have a fixed length of 40 hexadecimal digits. You must configure the complete address in the following dotted format:

```
xx.xxxx.xx.xxxxxx.xxxx.xxxx.xxxx.xxxx.xxxx.xxxx.xx
```

Note All ATM NSAP addresses should be entered in the dotted hexadecimal format shown above, which conforms to the User-Network Interface (UNI) specification.The dotted method provides some validation that the address is a legal value. If you know your address format is correct, the dots may be omitted.

Examples

In the following example, the source NSAP address for the interface is AB.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12:

```
atm nsap-address AB.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12
```

atm oam flush

To drop all current and future Operation, Administration, and Maintenance (OAM) cells received on an ATM interface, use the **atm oam flush** command in interface configuration mode. To receive OAM cells on an ATM interface, use the **no** form of this command.

atm oam flush

no atm oam flush

Syntax Description

This command has no arguments or keywords.

Defaults

Dropping of OAM cells is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
11.3	This command was introduced.

Examples

The following example drops all current and future OAM cells received on the ATM main interface with slot 0 and port 0:

```
interface atm 0/0
 atm oam flush
```

atm oversubscribe

To disable bandwidth management for service categories other than constant bit rate (CBR), use the **atm oversubscribe** command in interface configuration mode. To enable bandwidth management, use the **no** form of the command.

atm oversubscribe

no atm oversubscribe

Syntax Description

This command has no arguments or keywords.

Command Default

The default is to allow as much bandwidth as possible with no upper limits (except on DSL ATM interfaces, in which oversubscription is a factor of 2). The **no** form of the **atm oversubscribe** command enables bandwidth management on any ATM interface you specify.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(3)T	This command was introduced.
12.4(6)T	Support for this command was added to DSL ATM interfaces.

Usage Guidelines

When you type the enabling command (the **no** version), a check determines if the ATM link is already oversubscribed. If so, the command is rejected. Otherwise, the total bandwidth available on the link is recorded and all future connection setup requests are monitored to ensure that the link is not oversubscribed.

The bandwidth allocated for each service category is displayed in the output of the **show atm interface atm** command.

The ATM bandwidth manager keeps track of bandwidth used by VCs on a per-interface basis. Because many services require guaranteed bandwidth (for variable bit rate-real time (VBR-RT), available bit rate (ABR), CBR, for instance), bandwidth management is required. The purpose of the bandwidth manager is to reserve resources for connections that require guaranteed services. Bandwidth management for CBR is turned on automatically for all interfaces supporting CBR. Bandwidth management for other service categories must be turned on by the user. All service categories outside CBR are monitored only if specifically requested.

Note Because unspecified bit rate (UBR) does not provide any guarantees, bandwidth specified for a UBR connection is not used in any calculations.

In all cases, bandwidth check for a PVC is done when the PVC is configured. Bandwidth check for a SVC is done when a signaling call is placed or received.

When you specify the **atm pvp** command, the system checks if the specified bandwidth is available on the interface. If the bandwidth available is greater than or equal to the peak rate specified for the Permanent Virtual Path (PVP), the command is accepted; otherwise the command is rejected.

Within the VC mode, the steps taken to check for bandwidth available are to ascertain if the bandwidth is already used by the VC to fulfill the request. If the VC being configured is a PVC and belongs to a PVP, the bandwidth available on the PVP is used for the check; otherwise the bandwidth available on the interface is used for the check.

When services within a VC class are being configured, the steps taken are to check if the new bandwidth requirement can be fulfilled for all VCs using the class (on a per-interface basis) by comparing with the bandwidth available on the corresponding interface.

Bandwidth checking for an SVC occurs before a SETUP message is sent for an outbound call. If the bandwidth check fails, the SETUP message is not sent. If the bandwidth check passes, the traffic class from which the service category is inherited is updated with the requirements for the new SVC.

When an SVC setup is requested for remotely initiated calls, a bandwidth check occurs as soon as the SETUP message is received. This bandwidth check has two components:

- Match the bandwidth requested by the remote end with the bandwidth configured locally.
- Check if bandwidth configured locally can be satisfied currently.

If the bandwidth check fails, a RELEASE message is sent out and the call is rejected. If the bandwidth check passes, resources are reserved for the VC and the call is accepted.

Examples

The following example displays the available bandwidth after you enter VC mode. Notice that the bandwidth is specified in kbps.

```
Router# show atm interface atm 2/0

 Interface ATM2/0:
 AAL enabled: AAL5, Maximum VCs:1024, Current VCCs:5

 Maximum Transmit Channels:64
 Max. Datagram Size:4496
 PLIM Type:SONET - 155Mbps, TX clocking:LINE
 Cell-payload scrambling:OFF
 sts-stream scrambling:ON
 877 input, 120843834 output, 0 IN fast, 20 OUT fast
 ABR parameters, rif:16 rdf:16, 0 out drop
 Bandwidth distribution :CBR :16000  Avail bw = 139000
 Config. is ACTIVE
```

Notice that the bandwidth is specified as 139000 kbps.

Related Commands

Command	Description
atm oversubscribe factor	Enables finite line bandwidth oversubscription for DSL.
show atm interface atm	Displays ATM-specific information about an ATM interface.
ubr+	Configures unspecified bit rate plus for an ATM PVC.
vbr-nrt	Configures variable bit rate-nonreal time for an ATM PVC.
vbr-rt	Configures variable bit rate real-time for VoATM voice connections.

atm oversubscribe factor

To set up finite line bandwidth oversubscription for digital subscriber line (DSL), use the **atm oversubscribe factor** command in interface configuration mode. To disable finite line bandwidth oversubscription for DSL, use the **no** form of this command.

atm oversubscribe factor *factor*

no atm oversubscribe factor *factor*

Syntax Description

factor	Oversubscription factor in the range from 2 to 14000000000.

Command Default

Finite line bandwidth oversubscription for DSL is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.4(2)XA	This command was introduced.
12.4(6)T	This command was integrated into Cisco IOS Release 12.4(6)T.

Usage Guidelines

Resource limitations on Cisco xDSL interfaces require a way to configure bandwidth oversubscription up to a defined bandwidth (a *finite* oversubscription of bandwidth). For this requirement, the **atm oversubscribe factor** command is used. A DSL ATM interface supports only an oversubscribe factor of 2.

Oversubscription is allowed on variable bit rate real time class (VBR-rt), variable bit rate non-real time class (VBR-nrt), and unspecified bit rate plus (UBR+) permanent virtual circuits (PVCs). With oversubscription enabled, multiple VBR-rt, VBR-nrt, and UBR+ PVCs can be configured even when the sum of their sustainable cell rates (SCRs) exceeds the actual bandwidth available over the physical line. For example, if oversubscription is enabled and an oversubscription factor of 2 is set for a line rate of 2304 kbps, the sum of SCRs and minimum desired cell rates of VBR-rt, VBR-nrt, and UBR+ PVCs must be less than or equal to 4608 kbps, excluding the constant bit rate (CBR) PVC bandwidth.

An oversubscription factor of 2 is used internally; that is, VBR and UBR+ PVCs with a sum of SCRs up to twice the current line rate are valid. If you configure VBR-rt, VBR-nrt, or UBR+ for more than the configured oversubscription factor, the PVCs will be configured when bandwidth is available. But when no oversubscription bandwidth is available, a PVC is downgraded to an unspecified bit rate (UBR) (CBR PVCs are not affected, however); in this state, if you try to configure VBR or UBR+ PVCs beyond the line rate, the new PVCs will be downgraded to UBR state. If you have no oversubscription configured, each virtual circuit (VC) receives up to its configured SCR value of traffic, and VCs with higher SCR values receive more bandwidth. For example, if VC1 is a VBR-rt PVC configured with peak cell rate (PCR) and SCR line rates of 2304 kbps (command **vbr-rt 2304 2304**), VC2 is a VBR-nrt PVC configured with PCR and SCR line rates of 2000 kbps (command **vbr-nrt 2000 2000**), and VC3 has PCR

and SCR line rates of 496 kbps (command **vbr-rt 496 496**), then when no oversubscription bandwidth is available, VC1 and VC 2 are configured with the specified PCR and SCR line rates, but VC3 is downgraded to UBR class.

If the DSL line rate goes down and comes back up with less than the trained rate (based on the trained bandwidth PVCs) and no bandwidth is left, some PVCs might be downgraded to UBR class.

The value of the oversubscription factor determines the maximum bandwidth that is configured, which is the sum of SCRs for all VBR-rt, VBR-nrt, and UBR+. PVCs. To disable oversubscription, the total configured bandwidth of CBR, VBR-rt, VBR-nrt, and UBR+ must not exceed actual trained bandwidth. The CBR bandwidth is counted when disabling oversubscription.

With oversubscription disabled, a PVC can be configured only up to the line rate. For example, if the line rate is 2304 kbps, the SCR or PCR of a VBR PVC cannot be more than 2304 kbps (assuming there are no other PVCs). If there is another PVC, such as a CBR PVC with a PCR of 500 kbps, that line rate is subtracted, and the maximum SCR or PCR allowed on the VBR PVC is 1804 kbps.

The first time VBR-rt, VBR-nrt, or UBR+ PVCs are configured with the oversubscription factor enabled, the available bandwidth is checked. If the required bandwidth is available, the service class commands (**vbr-rt**, **vbr-nrt**, and **ubr+**) are accepted. If there is not enough requested bandwidth, the service class commands are rejected, and the PVC state will be UP with service class set to UBR.

After VBR-rt, VBR-nrt, or UBR+ PVCs are configured, a dynamic line rate modification occurs when the **atm oversubscribe factor** command is enabled. The available bandwidth is checked, and if the required amount is available, the PVC state will be UP with the configured service class. If there is not enough bandwidth, the PVC state will be UP with service class UBR.

DSL ATM interfaces do not support switched virtual circuits (SVCs).

Examples

The following example shows how to set oversubscription on the link by a factor of 2.

```
interface ATM0/0
 no ip address
 atm oversubscribe factor 2
 no atm ilmi-keepalive
 pvc 2/100
  vbr-nrt 2304 2304 1
 !
 pvc 3/100
  cbr 2304
 !
 pvc 4/100
  ubr+ 2304 2304
 !
 pvc 5/100
 !
```

The oversubscription configuration can be verified by using the **show atm interface** EXEC command. The report from the command indicates that the link is oversubscribed by 4608 kbps.

```
Router# show atm interface atm 0/0

Interface ATM0/0:
AAL enabled:  AAL5  , Maximum VCs: 23, Current VCCs: 4

VCIs per VPI: 256,
Max. Datagram Size: 4528
PLIM Type: GSHDSL - 2304Kbps, Framing is Unknown,, TX clocking: LINE
0 input, 0 output, 0 IN fast, 0 OUT fastCBR : 2304 UBR+ : 2304 VBR-NRT : 2304
Link oversubscribed by 4608 kbps
Config. is ACTIVE
```

Related Commands

Command	Description
atm oversubscribe	Disables bandwidth management for service categories other than CBR.
show atm interface atm	Displays ATM-specific information about an ATM interface.
ubr+	Configures unspecified bit rate plus for an ATM PVC.
vbr-nrt	Configures variable bit rate-nonreal time for an ATM PVC.
vbr-rt	Configures variable bit rate real-time for VoATM voice connections.

atm pppatm passive

To place an ATM subinterface in passive mode, use the **atm pppatm passive** command in ATM subinterface configuration mode. To change the configuration back to the default (active) mode, use the **no** form of this command.

atm pppatm passive

no atm pppatm passive

Syntax Description

This command has no arguments or keywords.

Defaults

Active mode

Command Modes

ATM subinterface configuration

Command History

Release	Modification
12.2(13)T	This feature was introduced.

Usage Guidelines

The **atm pppatm passive** command places PPP over ATM (PPPoA) sessions on an ATM subinterface in "listening" mode. Rather than trying to establish the sessions actively by sending out Link Control Protocol (LCP) packets, these sessions listen to the incoming LCP packets and become active only after they have received their first LCP packet. This feature is useful for L2TP access concentrators (LACs) in the broadband access deployments where thousands of PPPoA sessions are configured on LACs. When PPPoA is in the passive mode, the LAC will bring up the sessions only when the subscribers become active and not waste its processing power on polling all the sessions.

For better scalability and faster convergence of PPP sessions, Cisco recommends setting the PPPoA sessions to passive mode at the LAC.

Examples

The following example configures the passive mode for the PPPoA sessions on an ATM subinterface:

```
interface atm 1/0.1 multipoint
 atm pppatm passive
 range range-pppoa-1 pvc 100 199
  protocol ppp virtual-template 1
```

atm pvp

To create a permanent virtual path (PVP) used to multiplex (or bundle) one or more virtual circuits (VCs), use the **atm pvp** command in interface configuration mode. To remove a PVP, use the **no** form of this command.

atm pvp *vpi* [*peak-rate*]

no atm pvp *vpi*

Syntax Description

vpi	ATM network virtual path identifier (VPI) of the VC to multiplex on the permanent virtual path. The range is 0 to 255. The VPI is an 8-bit field in the header of the ATM cell. The VPI value is unique only on a single link, not throughout the ATM network because it has local significance only. The VPI value must match that of the switch. The number specified for the *vpi* must not already exist. If the number specified for the *vpi* is already being used by an existing VC, this command is rejected.
peak-rate	(Optional) Maximum rate in kbps at which the PVP can transmit data. The range is 84 kbps to line rate. The default is the line rate.

Defaults

PVP is not configured.
The default *peak-rate* is the line rate.

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

This command is commonly used to create a PVP that is used multiplex circuit emulation service (CES) and data VCs.

The ATM-CES port adapter supports multiplexing of one or more VCs over a virtual path that is shaped at a constant bandwidth. For example, you can buy a virtual path service from an ATM service provider and multiplex both the CES and data traffic over the virtual path.

All subsequently created VCs with a *vpi* argument matching the *vpi* specified with the **atm pvp** command are multiplexed onto this PVP. This PVP connection is an ATM connection where switching is performed on the VPI field of the cell only. A PVP is created and left up indefinitely. All VCs that are multiplexed over a PVP share and are controlled by the traffic parameters associated with the PVP.

Changing the *peak-rate* argument causes the ATM-CES port adapter to go down and then back up.

When you create a PVP, two VC are created (VCI 3 and 4) by default. These VCs are created for VP end-to-end loopback and segment loopback OAM support.

To verify the configuration of a PVP, use the **show atm vp** command in EXEC mode.

Examples

The following example creates a permanent virtual path with a peak rate of 2000 kbps. The subsequent VC created are multiplexed onto this virtual path.

```
interface atm 6/0
 atm pvp 1 2000
 atm pvc 13 1 13 aal5snap
 exit
interface cbr 6/1
 ces circuit 0
 ces pvc 9 interface atm6/0 vpi 1 vci 100
 exit
```

Related Commands

Command	Description
show atm vp	Displays the statistics for all VPs on an interface or for a specific VP.

atm rate-queue

To create a permanent rate queue or specify a rate queue tolerance, use the **atm rate-queue** command in interface configuration mode. To remove a rate queue or rate queue tolerance, use the **no** form of this command.

atm rate-queue {*queue-number speed* | **tolerance svc** [**pvc**] *tolerance-value* [**strict**]}

no atm rate-queue {*queue-number speed* | **tolerance svc** [**pvc**] *tolerance-value* [**strict**]}

Syntax Description

queue-number	Queue number in the range 0 through 7 on the ATM Interface Processor (AIP) for Cisco 7500 series routers, and in the range 0 through 3 on the network processing module (NPM) for Cisco 4500 and Cisco 4700 routers. On the AIP, queues 0 through 3 are in the high-priority bank, and queues 4 through 7 are in the low-priority bank. Queues in the same priority bank have the same priority; for example, queues 0 and 3 have the same priority. On the NPM, all 4 queues have the same priority.
speed	Speed in megabits per second (Mbps) in the range from 1 through 155. The maximum speed is determined by the detected physical layer inteface module (PLIM) type on the AIP or NPM: • 34 Mbps for E3 • 45 Mbps for DS-3 • 100 Mbps for Transparent Asynchronous Transmitter/Receiver Interface (TAXI) • 155 Mbps for Synchronous Optical Network (SONET)
tolerance	Specifies that you want to use a rate queue tolerance value.
svc	Specifies that the *tolerance-value* will be applied to SVCs.
pvc	(Optional) If specified, the *tolerance-value* will be applied to PVCs.
tolerance-value	A tolerance level expressed as a percentage used for assigning rate queues for each virtual circuit (VC) with a requested peak rate. This value is applied to switched virtual circuits (SVCs), discovered VCs, and permanent virtual circuits (PVCs) (when the **pvc** keyword is used). This value can be 0 or 5 through 99. For SVCs and discovered VCs, the default value is 10. For PVCs, the default value is 0.
strict	(Optional) Indicates whether SVC traffic-shaping parameters are altered beyond the SVC tolerance or rejects the incoming call.

Defaults

No rate queue is defined. The default rate-queue tolerance for SVCs and discovered VCs is 10. For PVCs, it is 0.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.
11.3	The following keywords were added: • **tolerance** • **svc**

Usage Guidelines

If a PVC or SVC is created, and its rate queue does not match a permanent rate queue that was created using the **atm-rate queue** *queue-number speed* command, one of the following will occur:

- The PVC or SVC will use an existing rate queue if the PVC's or SVC's rate queue falls within the *tolerance-value* specified.
- The software will dynamically create a new and unique rate queue if the PVC or SVC does not fall within a previously configured rate-queue tolerance.

If you do not create permanent rate queues or if you create PVCs with peak or average rates that are not matched by the rate queues you configure, the software dynamically creates rate queues as necessary to satisfy the requests of the **atm pvc** commands.

You can create multiple rate queues. A warning message appears if all rate queues are deconfigured or if the combined rate queues exceed the PLIM rate.

Examples

The following example configures a permanent rate queue with a *queue-number* of 1 and a *speed* of 100 Mbps:

```
atm rate-queue 1 100
```

The following example configures a rate queue with a *tolerance-value* of 20, which will apply to SVCs, discovered VCs, and PVCs.

```
interface atm 2/0
 atm rate-queue tolerance svc pvc 20
```

Related Commands

Command	Description
pvc	Configures the PVC interface.
svc	Creates an ATM SVC and specifies the destination NSAP address on a main interface or subinterface.

atm rawq-size

To define the ATM Interface Processor (AIP) raw-queue size, use the **atm rawq-size** command in interface configuration mode. To restore the default value, use the **no** form of this command.

atm rawq-size *number*

no atm rawq-size

Syntax Description

number	Maximum number of cells in the raw queue simultaneously. Range is from 8 to 256. Default is 32.

Defaults

32 cells

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

This command is supported on the Cisco 7200 and 7500 series routers, but not on the Cisco 4500 and Cisco 4700 routers.

The raw queue is used for raw ATM cells, which include Operation, Administration, and Maintenance (OAM) (F4 and F5) and Interim Local Management Interface (ILMI) cells.

Examples

The following example allows a maximum of 48 cells in the raw queue:

```
atm rawq-size 48
```

atm rxbuff

To set the maximum number of receive buffers for simultaneous packet reassembly, use the **atm rxbuff** command in interface configuration mode. To restore the default value, use the **no** form of this command.

atm rxbuff *number*

no atm rxbuff

Syntax Description

number	Maximum number of packet reassemblies that the ATM Interface Processor (AIP) can perform simultaneously. Range is from 0 to 512. Default is 256.

Defaults

256 packet reassemblies

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

This command is supported on AIP for Cisco 7500 series routers. This command is not supported on the ATM port adapter for Cisco 7200 and 7500 series routers, nor is it supported on Cisco 4500 and Cisco 4700 routers.

Examples

The following example allows the AIP to perform a maximum of 300 packet reassemblies simultaneously:

```
atm rxbuff 300
```

atm sig-traffic-shaping strict

To specify that a switched virtual circuit (SVC) should be established on an ATM interface only if shaping can be done in accordance with the signaled traffic parameters, use the **atm sig-traffic-shaping strict** command in interface configuration mode. To disable strict traffic shaping, use the **no** form of this command.

atm sig-traffic-shaping strict

no atm sig-traffic-shaping strict

Syntax Description

This command has no arguments or keywords.

Defaults

The default value is lenient (not strict) traffic shaping for SVCs.

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced.

Usage Guidelines

This command is supported on the Cisco 7500 series routers, Cisco 4500 routers, and Cisco 4700 routers. This command is not supported on the ATM port adapter.

If strict traffic shaping is configured on the router ATM interface, then an SVC is established only if traffic shaping can be provided for the transmit cell flow according to the signaled traffic parameters. If such shaping cannot be provided, the SVC is released.

If strict traffic shaping is not configured on the router ATM interface, an attempt is made to establish an SVC with traffic shaping for the transmit cell flow according to the signaled traffic parameters. If such shaping cannot be provided, the SVC is installed with default shaping parameters (it behaves as though a permanent virtual circuit (PVC) were created without specifying traffic parameters).

The signalling SETUP message carries the forward and backward traffic parameters. For connections initiated by the source router, traffic is shaped to the SETUP message forward parameters. For connections initiated by another router or host, traffic is shaped to the backward parameters.

Examples

The following example allows an SVC to be established on an ATM interface using only signaled traffic parameters:

```
atm sig-traffic-shaping strict
```

atm smds-address

To assign a unicast E.164 address to the ATM subinterface that supports ATM adaptation layer 3/4 (AAL3/4) and Switched Multimegabit Data Service (SMDS) encapsulation, use the **atm smds-address** command in interface configuration mode.

atm smds-address *address*

Syntax Description

address	Unicast E.164 address assigned to the subinterface.

Defaults

No E.164 address is assigned.

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced.

Usage Guidelines

This command is supported on Cisco 7500 series routers, Cisco 4500 routers, and Cisco 4700 routers. This command is not supported on the ATM port adapter.

Each AAL3/4 subinterface is allowed only one unicast E.164 address.

Examples

The following example assigns a unicast E.164 address to the ATM subinterface that is being configured:

```
atm smds-address c141.555.1212
```

Related Commands

Command	Description
abr	Selects ABR QoS and configures output peak cell rate and output minimum guaranteed cell rate for an ATM PVC or VC class.
atm aal aal3/4	Enables support for AAL3/4 on an ATM interface.
atm multicast	Assigns an SMDS E.164 multicast address to the ATM subinterface that supports AAL3/4 and SMDS encapsulation.
pvc	Configures the PVC interface.

atm sonet stm-1

To set the mode of operation and thus control type of ATM cell used for cell-rate decoupling on the SONET physical layer interface module (PLIM), use the **atm sonet stm-1** command in interface configuration mode. To restore the default Synchronous Transport Signal level 3, concatenated (STS-3c) operation, use the **no** form of this command.

atm sonet stm-1

no atm sonet stm-1

Syntax Description

This command has no arguments or keywords.

Defaults

STS-3c

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Use STM-1 in applications where the ATM switch requires “idle cells” for rate adaptation. An idle cell contains 31 zeros followed by a one. STM-1 is defined as a Synchronous Digital Hierarchy/Synchronous Transport Signal level 1 (SDH/STM-1) operation (ITU-T specification).

Use the default (STS-3c) in applications where the ATM switch requires “unassigned cells” for rate adaptation. An unassigned cell contains 32 zeros.

Examples

The following example specifies ATM SONET STM-1:

```
atm sonet stm-1
```

atm svc-upc-intent

To change the intended usage parameter control (UPC) mode that is to be used on the cell flow received into the switch fabric for switched virtual circuits (SVCs) or destination legs of soft permanent virtual circuits (PVCs) on an interface, use the **atm svc-upc-intent** command in interface configuration mode. Any change in this parameter is applied to SVCs or soft PVCs subsequently established on the interface. To assign the default value to the parameter, use the **no** form of this command.

atm svc-upc-intent [**abr** | **cbr** | **vbr-rt** | **vbr-nrt** | **ubr**] {**tag** | **pass** | **drop**}

no atm svc-upc-intent

Syntax Description

abr | **cbr** | **vbr-rt** | **vbr-nrt** | **ubr**	(Optional) Specifies the service category: • **abr**—available bit rate • **cbr**—constant bit rate • **vbr-rt**—variable bit rate, real time • **vbr-nrt**—variable bit rate, nonreal time • **ubr**—unspecified bit rate
tag	Specifies that cells that are received on the interface and that violate the traffic contract have their CLP bit set prior to entering the switching fabric.
pass	Specifies that cells received on the interface are passed to the switching fabric with no change, regardless of their conformance to the traffic contract.
drop	Specifies that cells that are received on the interface and that violate the traffic contract are dropped.

Defaults

pass

Command Modes

Interface configuration

Command History

Release	Modification
11.1(4)	This command was introduced on the LS1010.
12.2(4)B	This command was modified for the Cisco 6400 NSP.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.

Usage Guidelines

This configuration parameter determines the UPC to use for SVCs and for the destination leg of soft VC and VP. If policing is desired, it should be applied once for traffic entering a network.

Examples

In the following example, the intended UPC for SVCs on an interface is set to tagging:

```
Router(config-if)# atm svc-upc-intent tag
```

In the following example, the UBR traffic on an interface is passed while all other traffic is policed:

```
Router(config-if)# atm svc-upc-intent ubr pass
Router(config-if)# atm svc-upc-intent cbr tag
Router(config-if)# atm svc-upc-intent vbr-rt tag
Router(config-if)# atm svc-upc-intent vbr-nrt tag
Router(config-if)# atm svc-upc-intent abr drop
```

Related Commands

Command	Description
show atm interface	Displays ATM-specific information about an ATM interface.

atm txbuff

To set the maximum number of transmit buffers for simultaneous packet fragmentation, use the **atm txbuff** command in interface configuration mode. To restore the default value, use the **no** form of this command.

atm txbuff *number*

no atm txbuff

Syntax Description

number	Maximum number of packet fragmentations that the ATM Interface Processor (AIP) can perform simultaneously. Range is from 0 to 512. Default is 256.

Defaults

256

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

This command is supported on the AIP for Cisco 7500 series routers. This command is not supported on the ATM port adapter for Cisco 7200 and 7500 series routers, nor is it supported on Cisco 4500 and Cisco 4700 routers.

Examples

The following example configures the AIP to perform up to 300 packet fragmentations simultaneously:

```
atm txbuff 300
```

atm uni-version

To specify the User-Network Interface (UNI) version (3.0 or 3.1) the router should use when Interim Local Management Interface (ILMI) link autodetermination is unsuccessful or ILMI is disabled, use the **atm uni-version** command in interface configuration mode. To restore the default value to 3.0, use the **no** form of this command.

atm uni-version *version-number*

no atm uni-version *version-number*

Syntax Description

version-number	UNI version selected on an interface. Valid values are 3.0 and 3.1.

Defaults

Version 3.0

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Normally, when the ILMI link autodetermination is enabled on the interface and is successful, the router accepts the UNI version returned by ILMI. If the ILMI link autodetermination is unsuccessful or ILMI is disabled, the UNI version defaults to 3.0. You can override the default UNI version by using this command to enable UNI 3.1 signalling support. The **no** form of the command sets the UNI version to one returned by ILMI if ILMI is enabled and the link autodetermination process is successful. Otherwise, the UNI version reverts to 3.0.

Examples

The following example specifies UNI version 3.1 signaling port on the ATM interface 2/0:

```
interface atm 2/0
 atm uni-version 3.1
```

atm vc-per-vp

To set the maximum number of virtual channel identifier (VCIs) to support per virtual path identifier (VPI), use the **atm vc-per-vp** interface configuration command. To restore the default value, use the **no** form of this command.

atm vc-per-vp *number*

no atm vc-per-vp

Syntax Description

number	Maximum number of VCIs to support per VPI. See the following list for valid values: • AIP for Cisco 7500 series—Valid values are 16, 32, 64, 128, 256, 512, and 1024. • ATM port adapter for Cisco 7200 series and 7500 series—Valid values are 16, 32, 64, 128, 256, 512, 1024, and 2048. • NPM for Cisco 4500 and Cisco 4700 routers—Valid values are 32, 64, 128, 256, 512, 1024, 2048, 4096, and 8192. • Network module with IMA for the Cisco 2600 series and 3600 series—Valid values are 256, 512, and 1024.

Defaults

1024

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

This command controls the memory allocation in the ATM Interface Processor (AIP), ATM port adapter, ATM network module, or network processor module (NPM) to deal with the VCI table. It defines the maximum number of VCIs to support per VPI; it does not bound the VCI numbers.

An invalid VCI causes a warning message to be displayed.

Cisco 2600 and 3600 Series with IMA

Note For Cisco 2600 and 3600 series with IMA, changing the value of the **atm vc-per-vp** command on one interface affects all of the interfaces on that network module.

Table 1 lists the possible VCI ranges and corresponding VPI ranges for the Cisco 2600 and 3600 series with IMA.

Table 1 VCI and VPI Ranges for Cisco 2600 and 3600 Series with IMA

VCI Range	VPI Range
0–255	0–15, 64–79, 128–143, and 192–207
0–511	0–15, 64–79
0–1023	0–15

Examples

The following example sets the maximum number of VCIs per VPI to 512:

```
atm vc-per-vp 512
```

Related Commands

Command	Description
pvc	Configures the PVC interface.

atm vp-filter

To set the ATM Interface Processor (AIP) filter register, use the **atm vp-filter** command in interface configurationmode. To restore the default value, use the **no** form of this command.

atm vp-filter *hexvalue*

no atm vp-filter

Syntax Description

hexvalue	Value in hexadecimal format.

Defaults

0x7B

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

This command is supported on Cisco 7500 series routers, but not on Cisco 4500 and Cisco 4700 routers. This command is not supported on ATM port adapters.

This command allows you to specify a virtual path identifier (VPI) or range of VPIs to be used for ATM adaptation layer 3/4 (AAL3/4) processing. All other VPIs map to AAL5 processing. If only AAL5 processing is required, you can either let the virtual path filter default or set it to an arbitrary VPI so that AAL5 processing is performed on all VPIs.

This command configures the hexadecimal value used in the virtual path filter register in the reassembly operation. The virtual path filter comprises 16 bits. The virtual path filter register uses the most significant bits (bits 15 through 8, the left half of the filter) as mask bits, and uses bits 7 through 0 (the right half of the filter) as compare bits.

When a cell is received, the right half of the filter is exclusively NORed with the binary value of the incoming VPI. The result is then ORed with the left half of the filter (the mask). If the result is all ones, reassembly is done using the VCI/message identifier (MID) table (AAL3/4 processing). Otherwise, reassembly is done using the VPI-VCI pair table (AAL5 processing).

Examples

In the following example, all incoming cells are reassembled using AAL3/4 processing:

```
atm vp-filter ff00
```

In the following example, all incoming cells with the virtual path equal to 0 are reassembled using AAL3/4 processing; all other cells are reassembled using AAL5 processing:

```
atm vp-filter 0
```

In the following example, all incoming cells with the most significant bit of the virtual path set are reassembled using AAL3/4 processing; all other cells are reassembled using AAL5 processing:

```
atm vp-filter 7f80
```

atmsig close atm

To disconnect a switched virtual circuit (SVC), use the **atmsig close atm** command in EXEC mode.

AIP on Cisco 7500 series; ATM, ATM-CES, Enhanced ATM Port Adapter on Cisco 7200 Series; 1-port ATM-25 Network Module on Cisco 2600 and 3600 Series

atmsig close atm *slot*/*port vcd*

ATM and Enhanced ATM Port Adapter on Cisco 7500 series

atmsig close atm *slot*/*port-adapter*/*port vcd*

NPM on Cisco 4500 and Cisco 4700

atmsig close atm *number vcd*

Syntax Description

slot	ATM slot number. Use this format for the following platform configurations: • AIP on Cisco 7500 series routers. • ATM port adapter, ATM-CES port adapter, or enhanced ATM port adapter on Cisco 7200 series routers. • 1-port ATM-25 network module on Cisco 2600 and 3600 series routers.
/port	ATM port number. Because the AIP and all ATM port adapters have a single ATM interface, the port number is always 0. The slash (/) is required.
vcd	Virtual circuit descriptor of the signalling SVC to close.
slot/*port-adapter*	ATM slot number and port adapter number. Use this format for the ATM port adapter or ATM-CES port adapter on Cisco 7500 series routers.
number	ATM network processor module number for the NPM on Cisco 4500 and Cisco 4700 routers.

Command Modes

EXEC

Command History

Release	Modification
10.3	This command was introduced.
11.1	The *number* argument was added.

Usage Guidelines

Execute this command if you want to close a particular SVC. Because virtual circuits are numbered per interface, you must specify the ATM interface by its slot number.

Examples

The following example closes SVC 2 on ATM interface 4/0:

```
atmsig close atm4/0 2
```

broadcast

To configure broadcast packet duplication and transmission for an ATM virtual circuit (VC) class, permanent virtual circuit (PVC), switched virtual circuit (SVC), or VC bundle, use the **broadcast** command in the appropriate command mode. To disable transmission of broadcast packets for your ATM VC class, PVC, SVC, or VC bundle, use the **no** form of this command. To restore the default behavior according to the description in the "Usage Guidelines" section, use the **default** form of this command.

broadcast

no broadcast

default broadcast

Syntax Description

This command has no arguments or keywords.

Defaults

Broadcast transmission is not enabled.
For classical IP SVCs, broadcast is enabled.

Command Modes

Interface-ATM-VC configuration (for ATM PVCs and SVCs)
VC-class configuration (for a VC-class)
Bundle configuration (for a VC bundle)
PVC range configuration (for an ATM PVC range)
PVC-in-range configuration (for an individual PVC within a PVC range)

Command History

Release	Modification
11.3T	This command was introduced.
12.0(3)T	Enhancements were added for configuration of broadcast packet duplication and transmission for an ATM VC bundle.
12.1(5)T	This command was made available in PVC range and PVC-in-range configuration modes.

Usage Guidelines

If broadcasting and multipoint signaling are enabled on an SVC, a multipoint SVC will be created to handle the SVC.

Note If you use the **broadcast** command to configure broadcasting for an ATM PVC or SVC, VC-class, or VC bundle, this configuration takes precedence over any previous configuration using the **broadcast** command.

If the **broadcast** command is not explicitly configured on an ATM PVC, SVC, or VC bundle, the VC inherits the following default configuration (listed in order of precedence):

- Configuration of the **broadcast** command in a VC class assigned to the PVC, SVC, or VC bundle itself.
- Configuration of the **broadcast** command in a VC class assigned to the PVC's, SVC's, or VC bundle's ATM subinterface.
- Configuration of the **broadcast** command in a VC class assigned to the PVC's, SVC's, or VC bundle's ATM main interface.

Note When a VC is a member of a VC bundle, configuration using the **broadcast** command in VC-class configuration mode no longer applies to the VC. Bundle configuration takes precedence.

To use the **broadcast** command in bundle configuration mode, enter the **bundle** command to enact bundle configuration mode for the bundle for which you want to enable broadcast forwarding.

Examples

The following example enables the transmission of broadcast packets on an ATM PVC named "router5":

```
pvc router5 1/32
 broadcast
```

The following example enables the transmission of broadcast packets on an ATM PVC bundle named "bundle1":

```
bundle bundle1
 broadcast
```

Related Commands

Command	Description
class-int	Assigns a VC class to an ATM main interface or subinterface.
class-vc	Assigns a VC class to an ATM PVC, SVC, or VC bundle member.
encapsulation	Sets the encapsulation method used by the interface.
enwrap	Configures the Inverse ARP time period for an ATM PVC, VC class, or VC bundle.
oam-bundle	Enables end-to-end F5 OAM loopback cell generation and OAM management for a virtual circuit class that can be applied to a virtual circuit bundle.
am retry	Configures parameters related to OAM management for an ATM PVC, SVC, VC class, or VC bundle.
protocol (ATM)	Configures a static map for an ATM PVC, SVC, VC class, or VC bundle. Enables Inverse ARP or Inverse ARP broadcasts on an ATM PVC by either configuring Inverse ARP directly on the PVC, on the VC bundle, or in a VC class (applies to IP and IPX protocols only).
ubr	Configures UBR QoS and specifies the output peak cell rate for an ATM PVC, SVC, VC class, or VC bundle member.
ubr+	Configures UBR QoS and specifies the output peak cell rate and output minimum guaranteed cell rate for an ATM PVC, SVC, VC class, or VC bundle member.
vbr-nrt	Configures the VBR-NRT QoS and specifies output peak cell rate, output sustainable cell rate, and output maximum burst cell size for an ATM PVC, SVC, VC class, or VC bundle member.

cbr

To configure the constant bit rate (CBR) for the ATM circuit emulation service (CES) for an ATM permanent virtual circuit (PVC) on the Cisco MC3810 or the PA-A3 port adapter for the Cisco 7200 and 7500 series routers, use the **cbr** command in the appropriate configuration mode. To restore the default, use the **no** form of this command.

cbr *rate*

no cbr *rate*

Syntax Description

rate	Constant bit rate (also known as the average cell rate) for ATM CES. The valid range for this command is from 56 to 10000 kbps for ATM CES on the Cisco MC3810 or from 1 to 155000 kbps for the PA-A3 port adapter on the Cisco 7200 and 7500 series routers.

Defaults

The CBR is not configured.

Command Modes

Interface-ATM-VC configuration (for ATM PVCs and SVCs)
PVC range configuration (for an ATM PVC range)
PVC-in-range configuration (for an individual PVC within a PVC range)

Command History

Release	Modification
12.0	This command was introduced.
12.1(5)T	This command was made available in PVC range and PVC-in-range configuration modes.
12.2(5)	Support was added for the PA-A3 port adapter on the Cisco 7200 series routers.
12.2(7)	Support was added for the PA-A3 port adapter on the Cisco 7500 series routers.

Usage Guidelines

This command applies to ATM configuration on the Cisco MC3810 and the PA-A3 port adapter on the Cisco 7200 and 7500 series routers.

Examples

The following example configures the constant bit rate on ATM PVC 20 on the Cisco MC3810:

```
pvc 20
 cbr 56
```

Related Commands

Command	Description
ces cell-loss-integration-period	Sets the CES cell-loss integration period on the Cisco MC3810 multiservice concentrator.
ces clockmode synchronous	Configures the ATM CES synchronous clock mode on the Cisco MC3810 multiservice concentrator.
ces connect	Maps the CES service to an ATM PVC on the Cisco MC3810 multiservice concentrator.
ces initial-delay	Configures the size of the receive buffer of a CES circuit on the Cisco MC3810 multiservice concentrator.
ces max-buf-size	Configures the send buffer of a CES circuit on the Cisco MC3810 multiservice concentrator.
ces partial-fill	Configures the number of user octets per cell for the ATM CES on the Cisco MC3810 multiservice concentrator.
ces service	Configures the ATM CES type on the Cisco MC3810 multiservice concentrator.
encapsulation atm-ces	Enables CES ATM encapsulation on the Cisco MC3810 multiservice concentrator.

ces aal1 clock

To configure the ATM adaptation layer 1 (AAL1) timing recovery clock for the constant bit rate (CBR) interface, use the **ces aal1 clock** command in interface configuration mode. To return the clock to the default, use the **no** form of this command.

ces aal1 clock {**adaptive** | **srts** | **synchronous**}

no ces aal1 clock

Syntax Description

adaptive	Adjusts output clock on a received AAL1 on FIFO basis. Use in unstructured mode.
srts	Sets the clocking mode to synchronous residual time stamp.
synchronous	Configures the timing recovery to synchronous for structured mode.

Defaults

synchronous

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

The clock mode must be **synchronous** for structured mode. In unstructured mode, use the **adaptive** keyword when a network-derived clock is not available.

Use the **srts** keyword when a network-derived clock is available but devices attached to the CES port use a different clock reference. The **srts** keyword samples the incoming clock, subtracts from the network clock, and sends the remainder in an AAL1 header. The clock is reconstructed during output by adding the residual to the network reference.

Use the **synchronous** keyword for all other modes.

Examples

The following command sets the AAL1 timing recovery clock to adaptive mode:

```
interface cbr 4/0
 ces aal1 clock adaptive
```

Related Commands

Command	Description
ces aal1 service	Configures the type of CES used on the CBR interface.
ces dsx1 clock source	Configures a transmit clock source for the CBR interface.
network-clock-select (ATM)	Establishes the sources and priorities of the requisite clocking signals for an ATM-CES port adapter.

ces aal1 service

To configure the type of circuit emulation service used on the constant bit rate (CBR) interface, use the **ces aal1 service** command in interface configuration mode. To return the type of service to unstructured, use the **no** form of this command.

ces aal1 service {**structured** | **unstructured**}

no ces aal1 service

Syntax Description

structured	Sets the type of service to structured (cross-connect).
unstructured	Sets the type of service to unstructured (clear-channel).

Defaults

unstructured

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

The **structured** keyword means that each time slot is an independent entity grouped into circuits, where each circuit has an independent permanent virtual circuit (PVC).

The **unstructured** keyword reduces the incoming serial data on the receiving end of the ATM network. The keyword also sets the service to single circuit, single PVC, where all time slots are carried.

Examples

The following example changes the mode for the **ces aal1 service** command to structured:

```
interface cbr 4/0
 ces aal1 service structured
```

Related Commands

Command	Description
ces aal1 clock	Configures the AAL1 timing recovery clock for the CBR interface.
ces circuit	Configures the connection attributes for the CBR interface.
ces dsx1 clock source	Configures a transmit clock source for the CBR interface.
ces dsx1 framing	Selects the frame type for the data line on the CBR interface.
ces dsx1 lbo	Configures cable length for the CBR interface.
ces dsx1 linecode	Selects the line code type for the CBR interface.
ces dsx1 loopback	Enables a loopback for the CBR interface.
ces dsx1 signalmode robbedbit	Enables the signal mode as robbed bit on a CBR interface.

Command	Description
ces pvc	Configures the destination port for the circuit on the CBR interface.
show ces circuit	Displays detailed circuit information for the CBR interface.
show ces interface cbr	Displays detailed CBR port information.
show ces status	Displays the status of the ports on the ATM-CES port adapter.
show interface cbr	Displays the information about the CBR interface on the ATM-CES port adapter.

ces circuit

To configure the connection attributes for the constant bit rate (CBR) interface, use the **ces circuit** command in interface configuration mode. To return the connection attributes to the default or to enable the circuit, use the **no** form of this command.

ces circuit *circuit-number* [**cas | no cas**] [**cdv** *range*] [**circuit-name** *name*] [**on-hook-detection** *hex-number*] [**partial-fill** *range*] [**shutdown | no shutdown**] [**timeslots** *range*]

no ces circuit *circuit-number* [[**no**] **cas**] [**cdv** *range*] [**circuit-name** *name*] [**on-hook-detection** *hex-number*] [**partial-fill** *range*] [[**no**] **shutdown**] [**timeslots** *range*]

Syntax Description

circuit-number	Selects the circuit identification. For unstructured service, use 0. For T1 structured service, the range is from 1 to 24. For E1 structure service, the range is from 1 to 31.
cas	(Optional) Enables channel-associated signaling for structured service only. no cas disables channel-associated signaling. The default is **no cas**.
no cas	(Optional) Disables channel-associated signaling for structured service only. This is the default.
cdv *range*	(Optional) Enables the peak-to-peak cell delay variation requirement. The range for CDV is 1 through 65535 milliseconds. The default is 2000 milliseconds.
circuit-name *name*	(Optional) Sets the ASCII name for the circuit emulation service internetworking function CES-IWF circuit. The string for the circuit name ranges from 0 to 255. The default is CBR*x*/*x*:0.
on-hook-detection *hex-number*	(Optional) Enables detection of whether the circuit is on-hook. Hex values are 0 through F to indicate a 2- or 4-bit AB[CD] pattern to detect on-hook. The AB[CD] bits are determined by the manufacturer of the voice/video telephony device that is generating the CBR traffic.
partial-fill *range*	(Optional) Enables the partial AAL1 cell fill service for structured service only. The range is from 0 to 47. The default is 47.
shutdown	(Optional) Marks the CES-IWF circuit administratively down. The default is **no shutdown**.
no shutdown	(Optional) Returns the CES-IWF circuit to an administrative up state.
timeslots *range*	(Optional) Configures the time slots for the CES-IWF circuit for structured service only. The range is from 1 to 24 for T1. The range is from 1 to 31 for E1.

Defaults

No circuit is configured.

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

Channel-associated signalling (CAS) provides information about the time slot (on or off the hook) and is updated once per multiframe.

With both the CAS and on-hook detection features enabled, these features work together to enable an ingress node in an ATM network to monitor on-hook and off-hook conditions for a specified 1 x 64 structured CES circuit. As implied by the notation "1 x 64," the on-hook detection (or bandwidth-release) feature is supported only in a structured CES circuit that involves a single time slot at each end of the connection.

The time slot configured for the structured CES circuit at the ingress node (time slot 2) can be different from the DS0 time slot configured at the egress node (time slot 4). Only one such time slot can be configured at each end of the circuit when the on-hook detection feature is used.

When you invoke the on-hook feature, the ingress ATM-CES port adapter monitors the ABCD bits in the incoming CBR bit stream to detect on-hook and off-hook conditions in the circuit. In an "off-hook" condition, all the bandwidth provisioned for the specified CES circuit is used for transporting ATM AAL1 cells across the network from the ingress node to the egress node.

In an on-hook condition, the network periodically sends dummy ATM cells from the ingress node to the egress node to maintain the connection. However, these dummy cells consume only a fraction of the circuit's reserved bandwidth, leaving the rest of the bandwidth available for use by other network traffic. This bandwidth-release feature enables the network to make more efficient use of its resources.

When the CAS feature is enabled for a CES circuit, the bandwidth of the DS0 channel is limited to 56 kbps for user data, because CAS functions consume 8 kbps of channel bandwidth for transporting the ABCD signalling bits. These signalling bits are passed transparently from the ingress node to the egress node as part of the ATM AAL1 cell stream.

In summary, when the optional CAS and on-hook detection features are enabled, the following conditions apply:

- The permanent virtual connection (PVC) provisioned for the CES circuit always exists.
- The bandwidth for the CES circuit is always reserved.
- During an on-hook state, most of the bandwidth reserved for the CES circuit is not in use. (Dummy cells are sent from the ingress node to the egress node to maintain the connection.) Therefore, this bandwidth becomes available for use by other network traffic, such as available bit rate (ABR) traffic.
- During an off-hook state, all the bandwidth reserved for the CES circuit is dedicated to that circuit.

Examples

The following example sets the structured service CDV range to 5000 milliseconds and enables the interface:

```
interface cbr 4/0
 ces circuit 3 cdv 5000
 ces circuit 3 no shutdown
```

Related Commands

Command	Description
ces aal1 service	Configures the type of CES used on the CBR interface.
show ces circuit	Displays detailed circuit information for the CBR interface.
show ces interface cbr	Displays detailed CBR port information.
show ces status	Displays the status of the ports on the ATM-CES port adapter.
show interface cbr	Displays the information about the CBR interface on the ATM-CES port adapter.

ces dsx1 clock source

To configure a transmit clock source for the constant bit rate (CBR) interface, use the **ces dsx1 clock source** command in interface configuration mode. To return the clock source to the default, use the **no** form of this command.

ces dsx1 clock source {**loop-timed** | **network-derived**}

no ces dsx1 clock source

Syntax Description

loop-timed	Configures the transmit clock to loop (RX-clock to TX-clock).
network-derived	Configures the transmit clock to be derived from the network.

Defaults

network-derived

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Examples

The following example sets the clock source to loop-timed:

```
interface cbr 4/0
 ces dsx1 clock source loop-timed
```

Related Commands

Command	Description
ces aal1 clock	Configures the AAL1 timing recovery clock for the CBR interface.
ces aal1 service	Configures the type of CES used on the CBR interface.
network-clock-select (ATM)	Establishes the sources and priorities of the requisite clocking signals for an ATM-CES port adapter.
show ces circuit	Displays detailed circuit information for the CBR interface.
show ces interface cbr	Displays detailed CBR port information.
show interface cbr	Displays the information about the CBR interface on the ATM-CES port adapter.

ces dsx1 framing

To select the frame type for the data line on the constant bit rate (CBR) interface, use the **ces dsx1 framing** command in interface configuration mode. To return the frame type to the default, use the **no** form of this command.

T1

ces dsx1 framing {**esf** | **sf**}

no ces dsx1 framing

E1

ces dsx1 framing {**e1_crc_mfCASlt** | **e1_crc_mf_lt** | **e1_lt** | **e1_mfCAS_lt**}

no ces dsx1 framing

Syntax Description

esf	Configures the line type to extended super frame for T1.
sf	Configures the line type to super frame for T1.
e1_crc_mfCASlt	Configures the line type to E1 CRC with channel-associated signalling (CAS) enabled.
e1_crc_mf_lt	Configures the line type to E1 CRC with CAS disabled.
e1_lt	Configures the line type to E1 with CAS disabled.
e1_mfCAS_lt	Configures the line type to E1 with CAS enabled.

Defaults

esf (for T1)
e1_lt (for E1)

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

Use this command in configurations where the router communicates with the data line. The service provider determines which framing type is required for your circuit.

Examples

The following example sets the data line type to super frame:

```
interface cbr 4/0
 ces dsx1 framing sf
```

Related Commands

Command	Description
ces aal1 service	Configures the type of CES used on the CBR interface.
show ces circuit	Displays detailed circuit information for the CBR interface.
show ces interface cbr	Displays detailed CBR port information.
show ces status	Displays the status of the ports on the ATM-CES port adapter.
show interface cbr	Displays the information about the CBR interface on the ATM-CES port adapter.

ces dsx1 lbo

To configure cable length for the constant bit rate (CBR) interface, use the **ces dsx1 lbo** command in interface configuration mode. To return the cable length to the default, use the **no** form of this command.

ces dsx1 lbo *length*

no ces dsx1 lbo

Syntax Description

length	Sets the cable length. Values (in feet) are **0_110**, **110_200**, **220_330**, **330_440**, **440_550**, **550_660**, **660_above**, and **square_pulse**. Values represent a range in feet.

Defaults

0_110 feet

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

Set the cable length to the desired number of feet on your system.

Examples

The following example sets the cable length to 440 feet:

```
interface cbr 4/0
 ces dsx1 lbo 440_550
```

Related Commands

Command	Description
atm lbo	Specifies the cable length (line build-out) for the ATM interface.
ces aal1 service	Configures the type of CES used on the CBR interface.
show ces circuit	Displays detailed circuit information for the CBR interface.
show ces interface cbr	Displays detailed CBR port information.
show ces status	Displays the status of the ports on the ATM-CES port adapter.
show interface cbr	Displays the information about the CBR interface on the ATM-CES port adapter.

ces dsx1 linecode

To select the line code type for the constant bit rate (CBR) interface, use the **ces dsx1 linecode** command in interface configuration mode. To return the line code to the default, use the **no** form of this command.

T1

ces dsx1 linecode {**ami** | **b8zs**}

no ces dsx1 linecode

E1

ces dsx1 linecode {**ami** | **hdb3**}

no ces dsx1 linecode

Syntax Description

ami	Specifies the alternate mark inversion (AMI) as the line code type. Valid for T1 and E1 interfaces.
b8zs	Specifies B8ZS as the line code type. Valid for T1 interfaces. This is the default for T1.
hdb3	Specifies HDB3 as the line code type. Valid for E1 interfaces. This is the default for E1.

Defaults

b8zs (for T1
hdb3 (for E1)

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

Use this command in configurations where the switch communicates with the data line. The service provider determines which line code type is required for your circuit.

Examples

The following example specifies B8ZS as the line code type:

```
interface cbr 4/0
 ces dsx1 linecode b8zs
```

Related Commands

Command	Description
ces aal1 service	Configures the type of CES used on the CBR interface.
show ces circuit	Displays detailed circuit information for the CBR interface.

Command	Description
show ces interface cbr	Displays detailed CBR port information.
show ces status	Displays the status of the ports on the ATM-CES port adapter.
show interface cbr	Displays the information about the CBR interface on the ATM-CES port adapter.

ces dsx1 loopback

To enable a loopback for the constant bit rate (CBR) interface, use the **ces dsx1 loopback** command in interface configuration mode. To disable the loopback, use the **no** form of this command.

ces dsx1 loopback {**line** | **noloop** | **payload**}

no ces dsx1 loopback {**line** | **noloop** | **payload**}

Syntax Description

line	Sets the received signal to be looped at the line (does not penetrate the line).
noloop	Sets the interface to no loop.
payload	Sets the received signal to be looped through the device and returned.

Defaults

No loopback

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

This command is useful for testing the circuit emulation port adapter module.

Examples

The following example sets a payload loopback:

```
interface cbr 4/0
 ces dsx1 loopback payload
```

Related Commands

Command	Description
ces aal1 service	Configures the type of CES used on the CBR interface.
loopback	Configures the ATM interface into loopback mode.
show ces circuit	Displays detailed circuit information for the CBR interface.
show ces interface cbr	Displays detailed CBR port information.
show ces status	Displays the status of the ports on the ATM-CES port adapter.
show interface cbr	Displays the information about the CBR interface on the ATM-CES port adapter.

ces dsx1 signalmode robbedbit

To enable the signal mode as robbed bit on a constant bit rate (CBR) interface, use the **ces dsx1 signalmode robbedbit** command in interface configuration mode. To return the signal mode to the default, use the **no** form of this command.

ces dsx1 signalmode robbedbit

no ces dsx1 signalmode robbedbit

Syntax Description

This command has no arguments or keywords.

Defaults

No signal mode is enabled.

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

A T1 frame consists of 24 time slots (DS0) that send at a rate of 64 kbps. T1 defines the ability to send signaling in-band on individual time slots by removing the low bit of each byte for signaling in robbedbit mode. This procedure allows 8 kbps for signalling and leaves 56 kbps for data.

In structured mode, you can send the T1 signalling information across the network. Structured mode means that after you enable **robbedbit** signalling mode on the port, and enable CAS on individual circuits that need this type of service, you are robbing bits from the DS0. The system then puts the bits in the specified format to be sent across the network and reinserts them at the passive side on the CES-IWF connection.

Examples

The following example enables channel-associated signaling and robbed-bit signaling:

```
interface cbr 4/0
 ces circuit 1 cas
 ces dsx1 signalmode robbedbit
```

Related Commands

Command	Description
ces aal1 service	Configures the type of CES used on the CBR interface.
ces circuit	Configures the connection attributes for the CBR interface.
show ces circuit	Displays detailed circuit information for the CBR interface.
show ces interface cbr	Displays detailed CBR port information.

Command	Description
show ces status	Displays the status of the ports on the ATM-CES port adapter.
show interface cbr	Displays the information about the CBR interface on the ATM-CES port adapter.

ces partial-fill

To configure the number of user octets per cell for the ATM circuit emulation service (CES), use the **ces partial-fill** command in interface configuration mode. To delete the CES partial-fill value, use the **no** form of this command.

ces partial-fill *octets*

no ces partial-fill *octets*

Syntax Description

octets	Number of user octets per cell for the CES. Possible values of octet range from 0 to 47. The default is 47.

Defaults

47 octets

Command Modes

Interface configuration

Command History

Release	Modification
11.3 MA	This command was introduced.

Usage Guidelines

This command applies to ATM configuration on the Cisco MC3810.

Setting the value of the **ces partial-fill** command to zero disables partial cell fill and causes all cells to be completely filled before they are sent. This command is supported on serial ports 0 and 1 when the **encapsulation atm-ces** command is enabled.

Examples

The following example sets the CES partial cell fill to 20 octets per cell for serial port 0:

```
interface serial 0
 ces partial-fill 20
```

Related Commands

Command	Description
ces cell-loss-integration-period	Sets the CES cell-loss integration period on the Cisco MC3810 multiservice concentrator.
ces clockmode synchronous	Configures the ATM CES synchronous clock mode on the Cisco MC3810 multiservice concentrator.
ces connect	Maps the CES service to an ATM PVC on the Cisco MC3810 multiservice concentrator.
ces initial-delay	Configures the size of the receive buffer of a CES circuit on the Cisco MC3810 multiservice concentrator.

Command	Description
ces max-buf-size	Configures the send buffer of a CES circuit on the Cisco MC3810 multiservice concentrator.
ces service	Configures the ATM CES type on the Cisco MC3810 multiservice concentrator.

ces pvc

To configure the destination port for the circuit on the constant bit rate (CBR) interface, use the **ces pvc** command in interface configuration mode. To remove the destination port on the circuit, use the **no** form of this command.

ces pvc *circuit-number* **interface atm** *slot/port* **vpi** *number* **vci** *number*

no ces pvc *circuit-number* **interface atm** *slot/port* **vpi** *number* **vci** *number*

Syntax Description

circuit-number	Selects the circuit identification. The range is from 0 to 24. For unstructured service, use 0. For T1 structure service, the range is from 1 to 24. For E1 structure service, the range is from 1 to 31.
interface atm *slot/port*	Slot and port number of the ATM interface. The slash (/) is required. Used to create a hard permanent virtual circuit (PVC). Only a hard PVC can be configured for the CBR interfaces on the ATM-CES port adapter.
vpi *number*	Virtual path identifier of the destination PVC. Range is from 0 to 255.
vci *number*	Virtual channel identifier of the destination PVC. Range is from 1 to 16383.

Defaults

No destination port is configured.

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

Use the **interface** option to create a hard PVC. Use the **dest-atm-addr** option to create a soft PVC. Soft PVCs are not supported on Cisco 7200 series routers.

You must configure both sides of the CES circuits because at the source (the active side in CES-IWF), the time slots are not recognized at the destination (the passive side).

Each CES circuit has an ATM address. When configuring the source PVC, you need the destination ATM address.

Examples

The following example shows setting a hard PVC. In this example, the destination of ATM port 0 in slot 1 is assigned to circuit 31 on CBR port 0 in slot 1.

```
interface cbr 1/0
 ces pvc 31 interface atm 1/0 vpi 0 vci 512
```

Related Commands

Command	Description
ces aal1 service	Configures the type of CES used on the CBR interface.
show ces circuit	Displays detailed circuit information for the CBR interface.
show ces interface cbr	Displays detailed CBR port information.
show ces status	Displays the status of the ports on the ATM-CES port adapter.
show interface cbr	Displays the information about the CBR interface on the ATM-CES port adapter.

ces

To configure circuit emulation service (CES) on a router port and enter CES configuration mode, use the **ces** command in global configuration mode.

ces *slot/port*

Syntax Description

slot/port	Backplane slot number and port number on the interface. The port value is always 0 because the interface configuration applies to all ports in the slot. The slash (/) is required.

Defaults

No CES interface is configured.

Command Modes

Global configuration

Command History

Release	Modification
12.1(2)T	This command was introduced.

Usage Guidelines

This command is used on Cisco 2600 series and 3600 series routers that have OC-3/STM-1 ATM CES network modules.

The **ces** command enters CES configuration mode. Use CES configuration mode to configure CES parameters such as the CES clock.

Examples

The following example configures the CES interface in slot 2:

```
ces 2/0
```

Related Commands

Command	Description
clock-select	Allows the selection of clock sources and priority.

ces-cdv

To set the cell delay variation, use the **ces-cdv** command in interface-ATM-VC configuration mode.

ces-cdv *time*

Syntax Description

time	Maximum tolerable cell arrival jitter with a range from 1 to 65535 microseconds. Default is 5000.

Defaults

5000 microseconds

Command Modes

Interface-ATM-VC configuration

Command History

Release	Modification
12.1(2)T	This command was introduced.

Usage Guidelines

This command is used on Cisco 2600 series and 3600 series routers that have OC-3/STM-1 ATM CES network modules.

Examples

The following example configures the maximum tolerable cell arrival jitter at 7500 microseconds:

```
interface atm1/0
 pvc 0 0/41 ces
  ces-cdv 7500
```

Related Commands

Command	Description
interface atm	Configures the ATM interface.
svc	Configures the SVC.

class-int

To assign a virtual circuit (VC) class to an ATM main interface or subinterface, use the **class-int** command in interface configuration mode. To remove a VC class, use the **no** form of this command.

class-int *vc-class-name*

no class-int *vc-class-name*

Syntax Description

vc-class-name	Name of the VC class you are assigning to your ATM main interface or subinterface.

Defaults

No VC class is assigned to an ATM main interface or subinterface.

Command Modes

Interface configuration

Command History

Release	Modification
11.3(4)T	This command was introduced, replacing the **class** command for assigning VC classes to ATM main interfaces or subinterfaces.

Usage Guidelines

Use this command to assign a previously defined set of parameters (defined in a VC class) to an ATM main interface or subinterface. To create a VC class that defines these parameters, use the **vc-class atm** command. Refer to the section "Configuring VC Classes" in the "Configuring ATM" chapter of the *Cisco IOS Wide-Area Networking Configuration Guide* for more information.

To use this command for assigning a VC class to an ATM main interface or subinterface, you must first enter the **interface atm** command to enter interface configuration mode.

When you create a VC class for an ATM main interface or subinterface, you can use the following commands to define your parameters: **abr**, **broadcast**, **bump**, **encapsulation**, **idle-timeout**, **ilmi manage**, **inarp**, **oam-bundle**, **oam-pvc**, **oam retry**, **oam-svc**, **protocol**, **ubr**, **ubr+**, and **vbr-nrt**.

Parameters applied to an individual VC supersede interface- and subinterface-level parameters. Parameters that are configured for a VC through discrete commands entered in interface-ATM-VC configuration mode supersede VC class parameters assigned to an ATM main interface or subinterface by the **class-int** command.

Examples

In the following example, a class called "classA" is first created and then applied to ATM main interface 2/0:

```
! The following commands create the class classA:
vc-class atm classA
 ubr 10000
 encapsulation aal5mux ip


! The following commands apply classA to ATM main interface 2/0:
interface atm 2/0
 class-int classA
```

Related Commands

Command	Description
protocol (ATM)	Configures a static map for an ATM PVC, SVC, VC class, or VC bundle and enables Inverse ARP or Inverse ARP broadcasts on an ATM PVC.
show atm map	Displays the list of all configured ATM static maps to remote hosts on an ATM network.
vc-class atm	Configures a VC class for an ATM VC or interface.

class-vc

To assign a virtual circuit (VC) class to an ATM permanent virtual circuit (PVC), switched virtual circuit (SVC), or VC bundle member, use the **class-vc** command in the appropriate configuration mode. To remove a VC class, use the **no** form of this command.

class-vc *vc-class-name*

no class-vc *vc-class-name*

Syntax Description

vc-class-name	Name of the VC class you are assigning to your ATM PVC, SVC, or VC bundle member.

Defaults

No VC class is assigned to an ATM PVC, SVC, or VC bundle member.

Command Modes

Interface-ATM-VC configuration (for ATM PVCs and SVCs)
Bundle-vc configuration (for VC bundle members)
PVC-in-range configuration (for an individual PVC within a PVC range)

Command History

Release	Modification
11.3(4)T	This command was introduced, replacing the **class** command for assigning VC classes to ATM PVCs and SVCs.
12.0(3)T	This command was modified to support application of a VC class to an ATM VC bundle and an ATM VC bundle member.
12.1(5)T	This command was made available in PVC-in-range configuration mode.

Usage Guidelines

Use this command to assign a previously defined set of parameters (defined in a VC class) to an ATM PVC, SVC, or VC bundle member. To create a VC class that defines these parameters, use the **vc-class atm** command. Refer to the section "Configuring VC Classes" in the "Configuring ATM" chapter of the *Cisco IOS Wide-Area Networking Configuration Guide* for more information.

ATM PVCs and SVCs

To use this command for assigning a VC class to an ATM PVC or SVC, you must first enter the **interface atm** command in global configuration mode and then the **pvc** or **svc** command in interface configuration mode.

When you create a VC class for an ATM PVC or SVC, you can use the following commands to define your parameters: **abr**, **broadcast**, **bump**, **encapsulation**, **idle-timeout**, **ilmi manage**, **inarp**, **oam-bundle**, **oam-pvc**, **oam retry**, **oam-svc**, **protocol**, **ubr**, **ubr+**, and **vbr-nrt**.

Parameters that are configured for a PVC or SVC through discrete commands entered in interface-ATM-VC configuration mode supersede VC class parameters assigned to an ATM PVC or SVC by the **class-vc** command.

ATM VC Bundle Members

To use this command for assigning a VC class to a VC bundle member, you must first use the **pvc-bundle** command to enter bundle-vc configuration mode.

When you create a VC class for a VC bundle member, you can use the following commands to define your parameters: **bump**, **precedence**, **protect**, **ubr**, **ubr+**, and **vbr-nrt**. You cannot use the following commands in vc-class configuration mode to configure a VC bundle member: **encapsulation**, **protocol**, **inarp**, and **broadcast**. These commands are useful only at the bundle level, not the bundle member level.

Parameters applied to an individual VC supersede bundle-level parameters. Parameters that are directly configured for a VC through discrete commands entered in bundle-vc configuration mode supersede VC class parameters assigned to a VC bundle member by the **class-vc** command.

Examples

The following sections show examples for applying the **class-vc** command to ATM PVC, SVC, and VC bundle members.

In the following example, a class called “classA” is first created and then applied to an ATM PVC:

```
! The following commands create the class classA:
vc-class atm classA
 ubr 10000
 encapsulation aal5mux ip

! The following commands apply classA to an ATM PVC:
interface atm 2/0
 pvc router5 1/32
 class-vc classA
```

In the following example, a class called “classA” is first created and then applied to the bundle member called “vcmember”, a member of “bundle1”:

```
! The following commands create the class classA:
vc-class atm classA
 precedence 6-5
 no bump traffic
 protect group
 bump explicitly 7
 vbr-nrt 20000 10000 32

! The following commands create bundle1, add vcmember to bundle1, and then applies classA
! to vcmember:
bundle bundle1
 pvc-bundle vcmember
  class-vc classA
```

Taking into account hierarchy precedence rules, the VC bundle member “vcmember” will be characterized by these parameters:

- It carries traffic whose IP Precedence level is 6 and 5.
- It does not allow other traffic to be bumped onto it. When the VC goes down, its bumped traffic will be redirected to a VC whose IP Precedence level is 7.
- It is a member of the protected group of the bundle. When all members of a protected group go down, the bundle goes down.
- It has Variable Bit Rate-Non Real Time (VBR-NRT) quality of service traffic parameters.

Related Commands

Command	Description
class-bundle	Configures a VC bundle with the bundle-level commands contained in the specified VC class.
pvc-bundle	Adds a PVC to a bundle as a member of the bundle and enters bundle-vc configuration mode in order to configure that PVC bundle member.
show atm bundle	Displays the bundle attributes assigned to each bundle VC member and the current working status of the VC members.
show atm bundle statistics	Displays statistics on the specified bundle.
show atm map	Displays the list of all configured ATM static maps to remote hosts on an ATM network.
vc-class atm	Configures a VC class for an ATM VC or interface.

clear atm arp

To clear Address Resolution Protocol (ARP) entries for an ATM interface that is configured as an ARP server, use the **clear atm arp** command in privileged EXEC mode.

clear atm arp *atm-interface* {*ip-address* | *****}

Syntax Description

atm-interface	ATM interface number (for example, 3/0).
ip-address	Clears the ARP entry for the specified IP address.
*	Clears all ARP entries on the interface.

Defaults

No default behavior or values.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Use this command to clear ARP entries for an ATM interface. Specify the IP address of a particular entry to be deleted, or use the asterisk (*) to delete all the ARP entries for the interface.

If an ARP entry for an existing virtual circuit (VC) is deleted, the ARP server will immediately try to get another entry for that VC.

Examples

The following example shows how to delete the ARP entry for 172.20.173.28:

```
Router# clear atm arp 3/0 172.20.173.28
```

clear atm vc

To release a specified switched virtual circuit (SVC), use the **clear atm vc** command in privileged EXEC mode.

clear atm vc *vcd*

Syntax Description

vcd	Virtual channel descriptor of the channel to be released.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

For multicast or control virtual channel connections (VCCs), this command causes the LAN emulation (LANE) client to exit and rejoin an emulated LAN.

For data VCCs, this command also removes the associated LAN Emulation Address Resolution Protocol (LE ARP) table entries.

Examples

The following example shows how to release SVC 1024:

```
Router# clear atm vc 1024
```

clear lane le-arp

To clear the dynamic LAN Emulation Address Resolution Protocol (LE ARP) table or a single LE ARP entry of the LANE client configured on the specified subinterface or emulated LAN, use the **clear lane le-arp** command in user EXEC or privileged EXEC mode.

Cisco 7500 Series

clear lane le-arp [**interface** *slot/port* [**.***subinterface-number*] | **name** *elan-name*] [**mac-address** *mac-address* | **route-desc segment** *segment-number* **bridge** *bridge-number*]

Cisco 4500 and 4700 Routers

clear lane le-arp [**interface** *number* [**.***subinterface-number*] | **name** *elan-name*] [**mac-address** *mac-address* | **route-desc segment** *segment-number* **bridge** *bridge-number*]

Syntax Description

interface *slot/port*[**.***subinterface-number*]	(Optional) Interface or subinterface for the LAN emulation (LANE) client whose LE ARP table or entry is to be cleared for the Cisco 7500 series routers. The space between the **interface** keyword and the *slot* argument is optional.
interface *number*[**.***subinterface-number*]	(Optional) Interface or subinterface for the LANE client whose LE ARP table or entry is to be cleared for the Cisco 4500 or 4700 routers. The space between the **interface** keyword and the *number* argument is optional.
name *elan-name*	(Optional) Name of the emulated LAN for the LANE client whose LE ARP table or entry is to be cleared. Maximum length is 32 characters.
mac-address *mac-address*	(Optional) Keyword and MAC address of the LANE client.
route-desc segment *segment-number*	(Optional) Keywords and LANE segment number. The segment number ranges from 1 to 4095.
bridge *bridge-number*	(Optional) Keyword and bridge number that is contained in the route descriptor. The bridge number ranges from 1 to 15.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

This command removes dynamic LE ARP table entries only. It does not remove static LE ARP table entries.

If you do not specify an interface or an emulated LAN, this command clears all the LE ARP tables of any LANE client in the router.

If you specify a major interface (not a subinterface), this command clears all the LE ARP tables of every LANE client on all the subinterfaces of that interface.

This command also removes the fast-cache entries built from the LE ARP entries.

Examples

The following example shows how to clear all the LE ARP tables for all clients on the router:

```
Router# clear lane le-arp
```

The following example shows how to clear all the LE ARP tables for all LANE clients on all the subinterfaces of interface 1/0:

```
Router# clear lane le-arp interface 1/0
```

The following example shows how to clear the entry corresponding to MAC address 0800.aa00.0101 from the LE ARP table for the LANE client on the emulated LAN named red:

```
Router# clear lane le-arp name red 0800.aa00.0101
```

The following example shows how to clear all dynamic entries from the LE ARP table for the LANE client on the emulated LAN named red:

```
Router# clear lane le-arp name red
```

The following example shows how to clear the dynamic entry from the LE ARP table for the LANE client on segment number 1, bridge number 1 in the emulated LAN named red:

```
Router# clear lane le-arp name red route-desc segment 1 bridge 1
```

Note MAC addresses are written in the same dotted notation for the **clear lane le-arp** command as they are for the global IP **arp** command.

clear lane server

To force a LAN emulation (LANE) server to drop a client and allow the LANE configuration server to assign the client to another emulated LAN (ELAN), use the **clear lane server** command in user EXEC or privileged EXEC mode.

Cisco 7500 Series

clear lane server {**interface** *slot/port* [**.***subinterface-number*] | **name** *elan-name*} [**mac-address** *mac-address* | **client-atm-address** *atm-address* | **lecid** *lane-client-id* | **route-desc segment** *segment-number* **bridge** *bridge-number*]

Cisco 4500 and 4700 Routers

clear lane server {**interface** *number* [**.***subinterface-number*] | **name** *elan-name*} [**mac-address** *mac-address* | **client-atm-address** *atm-address* | **lecid** *lecid* | **route-desc segment** *segment-number* **bridge** *bridge-number*]

Syntax Description

interface *slot/port* [**.***subinterface-number*]	Interface or subinterface where the LANE server is configured for the Cisco 7500 series. The space between the **interface** keyword and the *slot* argument is optional.
interface *number* [**.***subinterface-number*]	Interface or subinterface where the LANE server is configured for the Cisco 4500 or 4700 routers. The space between the **interface** keyword and the *number* argument is optional.
name *elan-name*	Name of the emulated LAN on which the LANE server is configured. Maximum length is 32 characters.
mac-address *mac-address*	(Optional) Keyword and MAC address of the LANE client.
client-atm-address *atm-address*	(Optional) Keyword and ATM address of the LANE client.
lecid *lane-client-id*	(Optional) Keyword and ID of the LANE client. The LANE client ID is a value from 1 to 4096.
route-desc segment *segment-number*	(Optional) Keywords and LANE segment number. The segment number ranges from 1 to 4095.
bridge *bridge-number*	(Optional) Keyword and bridge number that is contained in the route descriptor. The bridge number ranges from 1 to 15.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

After changing the bindings on the configuration server, use this command on the LANE server to force the client to leave one emulated LAN. The LANE server will drop the Control Direct and Control Distribute virtual channel connections (VCCs) to the LANE client. The client will then ask the LANE configuration server for the location of the LANE server of the emulated LAN it should join.

If no LANE client is specified, all LANE clients attached to the LANE server are dropped.

Examples

The following example shows how to force all the LANE clients on the emulated LAN named red to be dropped. The next time they try to join, they will be forced to join a different emulated LAN.

```
Router# clear lane server name red
```

Related Commands

Command	Description
client-atm-address name	Adds a LANE client address entry to the configuration database of the configuration server.
lane database	Creates a named configuration database that can be associated with a configuration server.
mac-address	Sets the MAC layer address of the Cisco Token Ring.
show lane server	Displays global information for the LANE server configured on an interface, on any of its subinterfaces, on a specified subinterface, or on an ELAN.

clear mpoa client cache

To clear the ingress and egress cache entries of one or all Multiprotocol over ATM (MPOA) Clients MPCs, use the **clear mpoa client cache** command in user EXEC or privileged EXEC mode.

clear mpoa client [**name** *mpc-name*] **cache** [**ingress** | **egress**] [**ip-address** *ip-address*]

Syntax Description

name *mpc-name*	(Optional) Specifies the name of the MPC with the specified name.
ingress	(Optional) Clears ingress cache entries associated with the MPC.
egress	(Optional) Clears egress cache entries associated with the MPC.
ip-address *ip-address*	(Optional) Clears matching cache entries with the specified IP address.

Defaults

The system defaults are:

- All MPC cache entries are cleared.
- Both caches are cleared.
- Entries matching only the specified destination IP address are cleared.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Examples

The following example shows how to clear the ingress and egress cache entries for the MPC named ip_mpc:

```
Router# clear mpoa client name ip_mpc cache
```

Related Commands

Command	Description
show mpoa client cache	Displays the ingress or egress cache entries matching the IP addresses for the MPCs.

clear mpoa server cache

To clear the ingress and egress cache entries, use the **clear mpoa server cache** command in user EXEC or privileged EXEC mode.

clear mpoa server [**name** *mps-name*] **cache** [**ingress** | **egress**] [**ip-address** *ip-address*]

Syntax Description

name *mps-name*	(Optional) Specifies the name of the Multiprotocol over ATM (MPOA) Server (MPS). If this keyword is omitted, this command will apply to all servers.
ingress	(Optional) Clears ingress cache entries associated with the MPS.
egress	(Optional) Clears egress cache entries associated with the MPS.
ip-address *ip-address*	(Optional) Clears matching cache entries with the specified IP address. If this keyword is omitted, this command will clear all entries.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Examples

The following example shows how to clear all cache entries:

```
Router# clear mpoa server cache
```

Related Commands

Command	Description
show mpoa server cache	Displays ingress and egress cache entries associated with the MPS.

clear pppatm interface atm

To clear PPP ATM sessions on an ATM interface, use the **clear pppatm interface atm** command in privileged EXEC mode.

clear pppatm interface atm *interface-number*[**.***subinterface-number*] [**vc** {[*vpi*/]*vci* | *virtual-circuit-name*}]

Syntax Description

interface-number	ATM interface number.
.*subinterface-number*	(Optional) ATM subinterface number. A period must precede the number.
vc [*vpi*/]*vci*	(Optional) Specifies virtual circuit (VC) by virtual path identifier (VPI) and virtual channel identifier (VCI). A slash must follow the VPI.
virtual-circuit-name	(Optional) Specifies VC by name.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(13)T	This command was introduced.

Usage Guidelines

This command clears the PPP over ATM (PPPoA) sessions in an interface, or in a VC when the VC is specified.

When the **clear pppatm interface atm** command is used to clear sessions on an interface, PPP keepalives continue to work and can be used to detect a broken link.

Examples

The following example clears a PPP ATM session on ATM interface 1/0.10:

```
Router# clear pppatm interface atm 1/0.10
```

Related Commands

Command	Description
debug pppatm	Enables reports for PPPoA events, errors, and states either globally or conditionally on an interface or VC.
show pppatm summary	Displays PPPoA session counts.

client-atm-address name

To add a LAN emulation (LANE) client address entry to the configuration server's configuration database, use the **client-atm-address name** command in database configuration mode. To remove a client address entry from the table, use the **no** form of this command.

client-atm-address *atm-address-template* **name** *elan-name*

no client-atm-address *atm-address-template*

Syntax Description

atm-address-template	Template that explicitly specifies an ATM address or a specific part of an ATM address and uses wildcard characters for other parts of the ATM address, making it easy and convenient to specify multiple addresses matching the explicitly specified part. Wildcard characters can replace any nibble or group of nibbles in the prefix, the end-system identifier (ESI), or the selector fields of the ATM address.
name *elan-name*	Name of the emulated LAN. Maximum length is 32 characters.

Defaults

No address and no emulated LAN name are provided.

Command Modes

Database configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

The effect of this command is to bind any client whose address matches the specified template into the specified emulated LAN. When a client comes up, it consults the LANE configuration server, which responds with the ATM address of the LANE server for the emulated LAN. The client then initiates join procedures with the LANE server.

Before this command is used, the emulated LAN specified by the *elan-name* argument must have been created in the configuration server's database by use of the **name server-atm-address** command.

If an existing entry in the configuration server's database binds the LANE client ATM address to a different emulated LAN, the new command is rejected.

This command affects only the bindings in the named configuration server database. It has no effect on the LANE components themselves.

See the **lane database** command for information about creating the database, and the **name server-atm-address** command for information about binding the emulated LAN's name to the server's ATM address.

The **client-atm-address name** command is a subcommand of the global **lane database** command.

ATM Addresses

A LANE ATM address has the same syntax as a network service access point (NSAP), but it is not a network-level address. It consists of the following:

- A 13-byte prefix that includes the following fields defined by the ATM Forum:
  - AFI (Authority and Format Identifier) field (1 byte), DCC (Data Country Code) or ICD (International Code Designator) field (2 bytes), DFI (Domain Specific Part Format Identifier) field (1 byte), Administrative Authority field (3 bytes), Reserved field (2 bytes), Routing Domain field (2 bytes), and the Area field (2 bytes)
- A 6-byte ESI
- A 1-byte selector field

Address Templates

LANE ATM address templates can use two types of wildcards: an asterisk (*) to match any single character (nibble), and an ellipsis (...) to match any number of leading, middle, or trailing characters. The values of the characters replaced by wildcards come from the automatically assigned ATM address.

In LANE, a *prefix template* explicitly matches the prefix but uses wildcards for the ESI and selector fields. An *ESI template* explicitly matches the ESI field but uses wildcards for the prefix and selector.

In our implementation of LANE, the prefix corresponds to the switch, the ESI corresponds to the ATM interface, and the selector field corresponds to the specific subinterface of the interface.

Examples

The following example shows how to use an ESI template to specify the part of the ATM address corresponding to the interface. This example allows any client on any subinterface of the interface that corresponds to the displayed ESI value, no matter to which switch the router is connected, to join the emulated LAN named engineering:

```
ATM(lane-config-database)# client-atm-address ...0800.200C.1001.** name engineering
```

The following example shows how to use a prefix template to specify the part of the ATM address corresponding to the switch. This example allows any client on a subinterface of any interface connected to the switch that corresponds to the displayed prefix to join the emulated LAN named marketing:

```
ATM(lane-config-database)# client-atm-address 47.000014155551212f.00.00... name marketing
```

Related Commands

Command	Description
default-name	Provides an ELAN name in the database of the configuration server for those client MAC addresses and client ATM addresses that do not have explicit ELAN name bindings.
lane database	Creates a named configuration database that can be associated with a configuration server.
mac-address	Sets the MAC layer address of the Cisco Token Ring.
name *server-atm-address*	Specifies or replaces the ATM address of the LANE server for the ELAN in the configuration database of the configuration server.

dbs enable

To apply Dynamic Subscriber Bandwidth Selection (DBS) QoS parameters, use the **dbs enable** command in the appropriate configuration mode. To remove DBS QoS parameters, use the **no** form of this command.

dbs enable

no dbs enable

Syntax Description

This command has no arguments or keywords.

Defaults

DBS QoS parameters are not applied.

Command Modes

ATM VC class configuration
ATM VC configuration
ATM PVC range configuration
ATM PVC-in-range configuration

Command History

Release	Modification
12.2(4)B	This command was introduced.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.

Usage Guidelines

The **no dbs enable** command configured in any configuration mode overrides the **dbs enable** command configured in any configuration mode. Both the **dbs enable** and **no dbs enable** commands are saved in the running configuration and appear, when configured, in the output of the **show running-config** command. The **default dbs enable** command does not appear in the output of the **show running-config** command when configured.

When you enter the **dbs enable** or **no dbs enable** command, existing sessions are not disconnected. If you have a session that has been configured for DBS and you configure the **no dbs enable** command on a VC, additional sessions that are configured will display DBS-configured QoS values until the first new session is up. After the first session is brought up, the VC has default and locally configured values. If you configure the **dbs enable** command after multiple sessions are already up on the VC, all sessions on that VC have DBS QoS parameters.

RADIUS QoS attributes are applied to PVCs when a new PPP over Ethernet (PPPoE) session has peak cell rate (PCR) and sustainable cell rate (SCR) values that are higher than existing PPPoE sessions. If a new PPPoE session with lower PCR and SCR values is added to a PVC, the RADIUS QoS attributes are not applied to the new session. If the user of the PPPoE session that has the higher PCR and SCR values logs out, the QoS attributes are set to those of the lower bandwidth user.

RADIUS QoS attributes override attributes on a PVC configured in ATM PVC-in-range or ATM PVC range configuration mode. If the RADIUS QoS attributes cannot be applied to a PVC, PPPoE and PPPoA sessions cannot be established.

When DBS is configured, normal ATM precedences apply. PVC configurations take precedence over VC class configurations. Thus, if DBS QoS parameters are applied on a VC class and disabled on one PVC in that VC class, DBS QoS parameters are not applied on the PVC. ATM PVC-in-range configurations take precedence over PVC range configurations.

When you configure DBS on a PVC, existing sessions on that PVC remain connected.

Examples

The following example configures DBS in ATM VC class configuration mode:

```
vc-class atm pppoe
 dbs enable
```

The following example configures DBS in ATM VC configuration mode:

```
interface atm0/0/0.5 point-to-point
 ip address 10.0.0.0 255.255.255.0
 pvc 0/100
  dbs enable
  protocol pppoe
```

The following example configures DBS in ATM PVC range configuration mode:

```
interface atm0/0/0.1 multipoint
 ip address 10.0.0.0 255.255.255.0
 range pvc 0/50 0/70
  dbs enable
```

The following example configures DBS in ATM PVC-in-range configuration mode:

```
interface atm0/0/0.1 multipoint
 range pvc 0/50 0/70
  pvc-in-range 60
   dbs enable
```

Related Commands

Command	Description
pvc	Creates or assigns a name to an ATM PVC, specifies the encapsulation type on an ATM PVC, or enters interface-ATM-VC configuration mode.
pvc-in-range	Configures an individual PVC within a PVC range.
range pvc	Defines a range of ATM PVCs.
show atm pvc dbs	Displays all ATM PVCs on which DBS QoS parameters are applied.
vc-class atm	Configures a VC class for an ATM VC or interface.

default-name

To provide an emulated LAN name in the configuration server's database for those client MAC addresses and client ATM addresses that do not have explicit emulated LAN name bindings, use the **default-name** command in database configuration mode. To remove the default name, use the **no** form of this command.

default-name *elan-name*

no default-name

Syntax Description

elan-name	Default emulated LAN name for any LAN emulation (LANE) client MAC address or LANE client ATM address not explicitly bound to any emulated LAN name. Maximum length is 32 characters.

Defaults

No name is provided.

Command Modes

Database configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

This command affects only the bindings in the configuration server's database. It has no effect on the LANE components themselves.

The named emulated LAN must already exist in the configuration server's database before this command is used. If the default name-to-emulated LAN name binding already exists, the new binding replaces it.

The **default-name** command is a subcommand of the global **lane database** global configuration command.

Examples

The following example shows how to specify the emulated Token Ring LAN named man as the default emulated LAN. Because none of the emulated LANs are restricted, clients are assigned to whichever emulated LAN they request. Clients that do not request a particular emulated LAN will be assigned to the named man emulated LAN.

```
lane database example2
 name eng server-atm-address 39.000001415555121101020304.0800.200c.1001.02
 name eng local-seg-id 1000
 name man server-atm-address 39.000001415555121101020304.0800.200c.1001.01
 name man local-seg-id 2000
 name mkt server-atm-address 39.000001415555121101020304.0800.200c.4001.01
 name mkt local-seg-id 3000
 default-name man
```

Related Commands

Command	Description
client-atm-address name	Adds a LANE client address entry to the configuration database of the configuration server.
lane database	Creates a named configuration database that can be associated with a configuration server.
mac-address	Sets the MAC layer address of the Cisco Token Ring.
name server-atm-address	Specifies or replaces the ATM address of the LANE server for the ELAN in the configuration database of the configuration server.

dxi map

To map a protocol address to a given virtual path identifier (VPI) and virtual channel identifier (VCI), use the **dxi map** command in interface configuration mode. To remove the mapping for that protocol and protocol address, use the **no** form of this command.

dxi map *protocol protocol-address vpi vci* [**broadcast**]

no dxi map *protocol protocol-address*

Syntax Description

protocol	One of the following bridging or protocol keywords: **appletalk**, **bridge**, **clns**, **decnet**, **ip**, or **novell**.
protocol-address	Protocol-specific address.
vpi	Virtual path identifier in the range from 0 to 15.
vci	Virtual circuit identifier in the range from 0 to 63.
broadcast	(Optional) Address to which broadcasts should be forwarded.

Defaults

No map definition is established.

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced.
12.2(13)T	The **apollo**, **vines**, and **xns** arguments were removed because Apollo Domain, Banyan VINES, and Xerox Network Systems are no longer supported in the Cisco IOS software.

Usage Guidelines

This command is used in configurations where the router is intended to communicate with an ATM network through an ATM data service unit (ADSU). Given the circuit identifier parameters (VPI and VCI) for the ATM permanent virtual circuit (PVC), the router computes and uses the DXI frame address (DFA) that is used for communication between the router and the ADSU.

The **dxi map** command can be used only on a serial interface or HSSI configured for ATM-DXI encapsulation.

Examples

The following example converts all IP packets intended for the host with IP address 172.21.170.49 into ATM cells identified with a VPI of 2 (binary 0000 0010) and a VCI of 46 (binary 0000 0000 0010 1110) by the ADSU:

```
interface serial 0
 dxi map ip 172.21.170.49 2 46 broadcast
```

Using the mapping defined in Annex A of the ATM DXI Specification, the router uses the VPI and VCI information in this example to compute a DFA of 558 (binary 1000101110). The ADSU will use the DFA of the incoming frame to extract the VPI and VCI information when formulating ATM cells.

Related Commands

Command	Description
dxi pvc	Configures multiprotocol or single-protocol ATM-DXI encapsulation.
encapsulation atm-dxi	Enables ATM-DXI encapsulation.

dxi pvc

To configure multiprotocol or single protocol ATM-Data Exchange Interface (DXI) encapsulation, use the **dxi pvc** command in interface configuration mode. To disable multiprotocol ATM-DXI encapsulation, use the **no** form of this command.

dxi pvc *vpi vci* [**snap** | **nlpid** | **mux**]

no dxi pvc *vpi vci* [**snap** | **nlpid** | **mux**]

Syntax Description

vpi	ATM network virtual path identifier (VPI) of this permanent virtual circuit (PVC), in the range from 0 to 15. The VPI is a 4-bit field in the header of the ATM DXI frame. The VPI value is unique only on a single interface, not throughout the ATM network, because it has local significance only. Both *vpi* and *vci* cannot be specified as 0; if one is 0, the other cannot be 0.
vci	ATM network virtual channel identifier (VCI) of this PVC, in the range from 0 to 63. The VCI is a 6-bit field in the header of the ATM DXI frame. The VCI value is unique only on a single interface, not throughout the ATM network, because it has local significance only. Both *vpi* and *vci* cannot be specified as 0; if one is 0, the other cannot be 0.
snap	(Optional) LLC/SNAP encapsulation based on the protocol used in the packet. This keyword defines a PVC that can carry multiple network protocols. This is the default.
nlpid	(Optional) RFC 1294/1490 encapsulation. This option is provided for backward compatibility with the default encapsulation in earlier versions of the Cisco IOS software.
mux	(Optional) MUX encapsulation; the carried protocol is defined by the **dxi map** command when the PVC is set up. This keyword defines a PVC that carries only one network protocol.

Defaults

LLC/SNAP encapsulation

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced.

Usage Guidelines

This command can be used only on a serial interface or HSSI that is configured with ATM-DXI encapsulation.

Select the **nlpid** option if you are using the default encapsulation for software releases earlier than Cisco IOS Release 10.3.

Examples

The following example configures ATM-DXI MUX encapsulation on serial interface 1. The PVC identified by a VPI of 10 and a VCI of 10 can carry a single protocol. Then the protocol to be carried on this PVC is defined by the **dxi map** command.

```
interface serial 1
 dxi pvc 10 10 mux
 dxi map ip 172.21.176.45 10 10 broadcast
```

The following example configures ATM-DXI NLPID encapsulation on serial interface 1. The PVC identified by a VPI of 11 and a VCI of 12 can carry multiprotocol traffic that is encapsulated with a header described in RFC 1294/1490.

```
interface serial 1
 dxi pvc 11 12 nlpid
```

Related Commands

Command	Description
class-int	Maps a protocol address to a given VPI and VCI.
encapsulation atm-dxi	Enables ATM-DXI encapsulation.
show dxi pvc	Displays the PVC statistics for a serial interface.

encapsulation (ATM)

To configure the ATM adaptation layer (AAL) and encapsulation type for an ATM virtual circuit (VC), VC class, VC, bundle, or permanent virtual circuit (PVC) range, use the **encapsulation** command in the appropriate mode. To remove an encapsulation type, use the **no** form of this command.

encapsulation {**aal2** | **aal5auto** | **aal5autoppp virtual-template** *number* [**group** *group-name*] | **aal5ciscoppp virtual-template** *number* | **aal5mux** *protocol* | **aal5nlpid** | **aal5snap**}

no encapsulation {**aal2** | **aal5auto** | **aal5autoppp virtual-template** *number* [**group** *group-name*] | **aal5ciscoppp virtual-template** *number* | **aal5mux** *protocol* | **aal5nlpid** | **aal5snap**}

Syntax Description

aal2	AAL and encapsulation type for PVCs dedicated to AAL2 Voice over ATM.
aal5auto	AAL and encapsulation type for PPP over ATM (PPPoA) switched virtual circuits (SVCs). Enables an ATM SVC to use either **aal5snap** or **aal5mux** encapsulation options.
aal5autoppp	Enables PPPoA/PPPoE autosense. PPPoA/PPPoE autosense enables a router to distinguish between incoming PPPoA and PPP over Ethernet (PPPoE) sessions and create virtual access for both PPP types based on demand.
virtual-template *number*	Number used to identify the virtual template.
group	(Optional) Specifies that a PPPoE profile will be used by PPPoE sessions on the interface.
group-name	(Optional) Name of the PPPoE profile to be used by PPPoE sessions on the interface.
aal5ciscoppp	AAL and encapsulation type for Cisco PPP over ATM. Supported on ATM PVCs only.
aal5mux	AAL and encapsulation type for multiplex (MUX)-type VCs. A protocol must be specified when using this encapsulation type.
protocol	Protocol type being used by the MUX-encapsulated VC. Possible values for the *protocol* argument are as follows: • **appletalk**—AppleTalk protocol. • **decnet**—DECnet protocol. • **frame-relay**—Frame Relay-ATM Network Interworking (FRF.5) on the Cisco MC3810. • **fr-atm-srv**—Frame Relay-ATM Service Interworking (FRF.8) on the Cisco MC3810. • **ip**—IP protocol. • **ipx**—IPX protocol. • **ppp virtual-template** *number*—Internet Engineering Task Force (IETF)-compliant PPP over ATM. Use the **virtual-template** *number* options to identify the virtual template. Supported on ATM PVCs only. • **voice**—Voice over ATM.

aal5nlpid	AAL and encapsulation type that allows ATM interfaces to interoperate with High-Speed Serial Interfaces (HSSIs) that are using an ATM data service unit (ADSU) and running ATM-Data Exchange Interface (DXI). Supported on ATM PVCs only.
aal5snap	AAL and encapsulation type that supports Inverse ARP. Logical Link Control/Subnetwork Access Protocol (LLC/SNAP) precedes the protocol datagram.

Defaults

The global default encapsulation option is **aal5snap**. See the "Usage Guidelines" section for other default characteristics.

Command Modes

ATM VC configuration (for an ATM PVC or SVC)
VC-class configuration (for a VC class)
Bundle configuration (for a VC bundle)
PVC range configuration (for an ATM PVC range)
PVC-in-range configuration (for an individual PVC within a PVC range)

Command History

Release	Modification
11.3 T	This command was introduced.
12.0(3)T	This command was enhanced to provide encapsulation configuration for ATM VC bundles. The **aal5mux frame** and **aal5mux voice** keywords were added for the Cisco MC3810 series router.
12.0(7)XK	Support for the **aal5mux voice** option was added to Cisco 3600 series routers.
12.0(7)T	The **aal5mux fr-atm-srv** option was added for the Cisco MC3810 router. The **aal5mux frame** option was changed to **aal5mux frame-relay**.
12.1(1)XA	Support for the **aal2** option was added to the Cisco MC3810 router.
12.1(3)T	The **aal5auto** option was added to provide encapsulation configuration for PPP over ATM SVCs.
12.1(5)XM	Support for the **aal2** option was added to the Cisco AS5300 access server and Cisco 3600 multiservice platforms.
12.1(5)T	The **aal5ciscoppp**, **aal5mux**, and **aal5snap** options were made available in PVC range and PVC-in-range configuration modes.
12.2(2)T	This command was integrated into Cisco IOS Release 12.2(2)T.
12.1(1)DC1	The **aal5autoppp** option was introduced on the Cisco 6400 universal access concentrator.
12.2(4)T	The **aal5autoppp** option was implemented in Cisco IOS Release 12.2(4)T.
12.2(13)T	The **apollo**, **vines**, and **xns** values were removed as options for the *protocol* argument because Apollo Domain, Banyan VINES, and Xerox Network Systems are no longer supported in the Cisco IOS software.
12.2(15)T	The **group** option was added.
12.3(7)XI3	This command was integrated into Cisco IOS Release 12.3(7)XI3.

Usage Guidelines

Use the **aal5mux** encapsulation option to dedicate the specified PVC to a single protocol; use the **aal5snap** encapsulation option to multiplex two or more protocols over the same PVC. Whether you select **aal5mux** or **aal5snap** encapsulation might depend on practical considerations, such as the type of network and the pricing offered by the network. If the pricing of the network depends on the number of PVCs set up, **aal5snap** might be the appropriate choice. If pricing depends on the number of bytes transmitted, **aal5mux** might be the appropriate choice because it has slightly less overhead.

Note To configure Integrated Local Management Interface (ILMI), QSAAL, or Switched Multimegabit Data Service (SMDS) encapsulations for an ATM PVC, use the **pvc** command.

Encapsulation for PPPoA

When configuring Cisco PPP over ATM, use the **aal5ciscoppp** keyword and specify the virtual template number.

It is possible to implicitly create a virtual template when configuring Cisco PPP over ATM. In other words, if the parameters of the virtual template are not explicitly defined before you configure the ATM PVC, the PPP interface will be brought up using default values from the virtual template identified. However, some parameters (such as an IP address) take effect only if they are specified before the PPP interface comes up. Therefore, we recommend that you explicitly create and configure the virtual template before configuring the ATM PVC to ensure that such parameters take effect.

If you specify virtual template parameters after the ATM PVC is configured, you should enter a **shutdown** command followed by a **no shutdown** command on the ATM subinterface to restart the interface, causing the newly configured parameters (such as an IP address) to take effect.

Configuring PPPoA/PPPoE Autosense

Use the **encapsulation aal5autoppp virtual-template** *template-number* command to configure PPPoA/PPPoE autosense. PPPoA/PPPoE autosense enables a router to distinguish between incoming PPPoA and PPPoE sessions and create virtual access for both PPP types based on demand.

If a PPPoE profile is not specified by using the **group** *group-name* option, PPPoE sessions will be established using parameters from the global PPPoE profile. PPPoE profiles must be configured using the **bba-group pppoe** command.

Note Do not use this command on a router that initiates PPPoA sessions.

Entering the **no encapsulation aal5autoppp virtual-template** command will terminate the PPPoA or PPPoE session and detach the virtual-access interface from the PVC.

Configuring Encapsulation for VC Bundles

Before using this command to configure a VC bundle, enter the **bundle** subinterface configuration command to create a new bundle or modify an existing one and to enter bundle configuration mode.

A VC bundle can have only one encapsulation configured for it: either **aal5snap** or **aal5mux.**

Encapsulation Rules of Precedence

If the **encapsulation** command is not explicitly configured on an ATM PVC, SVC, or VC bundle, the VC inherits the following default configuration (listed in order of precedence from lowest to highest):

- Configuration of the **encapsulation** command in a VC class assigned to the PVC, PVC bundle, or SVC itself.
- Configuration of the **encapsulation** command in a VC class assigned to the ATM subinterface of the PVC, SVC, or VC bundle.
- Configuration of the **encapsulation** command in a VC class assigned to the ATM main interface of the PVC, SVC, or VC bundle.
- Global encapsulation option default: **aal5snap**

Note When a VC is a member of a VC bundle, configuration using the **encapsulation** command in VC-class mode no longer applies to the VC. Bundle configuration takes precedence.

Configuring Encapsulation for a PVC Range

When a PVC range or an individual PVC within a PVC range is being configured, the following options are available:

- **encapsulation aal5ciscoppp**
- **encapsulation aal5mux**
- **encapsulation aal5snap**

Examples

MUX-Type Encapsulation on a VC Example

The following example configures an ATM PVC with VPI 0 and VCI 33 for a MUX-type encapsulation using IP:

```
interface atm 1/0
 pvc 0/33
  encapsulation aal5mux ip
```

SNAP Encapsulation Example

The following example configures a bundle called “chicago” for **aal5snap** encapsulation:

```
bundle chicago
 encapsulation aal5snap
```

PPP over ATM SVCs Example

The following example configures an ATM SVC called “chicago” with the encapsulation type **aal5auto**. Encapsulation type **aal5auto** enables the SVC to use PPP and either **aal5snap** or **aal5mux** encapsulation.

```
interface ATM 2/0/0
 svc chicago
  encapsulation aal5auto
```

PPPoA/PPPoE Autosense Example

The following example enables PPPoA/PPPoE autosense on PVC 30/33. PPPoA sessions will use virtual template 1, and PPPoE sessions will use the global PPPoE profile.

```
interface ATM 0/0/0.33 multipoint
 pvc 30/33
 encapsulation aal5autoppp virtual-template 1
!
bba-group pppoe global
 virtual-template 1
 sessions max limit 8000
 sessions per-vc limit 8
 sessions per-mac limit 2
```

AAL2 Voice over ATM Example

The following example configures a PVC to support AAL2 encapsulation for Voice over ATM:

```
interface ATM0.2 point-to-point
 pvc 2/200
  vbr-rt 760 760 100
  encapsulation aal2
```

Related Commands

Command	Description
bba-group pppoe	Creates a PPPoE profile.
broadcast	Configures broadcast packet duplication and transmission for an ATM VC class, PVC, SVC, or VC bundle.
class-vc	Assigns a VC class to an ATM PVC, SVC, or VC bundle member.
debug pppoe	Displays debugging information for PPPoE sessions.
inarp	Configures the Inverse ARP time period for an ATM PVC, VC class, or VC bundle.
oam retry	Configures parameters related to OAM management for an ATM PVC, SVC, VC class, or VC bundle.
protocol (ATM)	Configures a static map for an ATM PVC, SVC, VC class, or VC bundle and enables Inverse ARP or Inverse ARP broadcasts on an ATM PVC.

encapsulation atm-dxi

To enable ATM-Data Exchange Interface (DXI) encapsulation, use the **encapsulation atm-dxi** command in interface configuration mode. To disable ATM-DXI, use the **no** form of this command.

encapsulation atm-dxi

no encapsulation atm-dxi

Syntax Description

This command has no arguments or keywords.

Defaults

When ATM-DXI encapsulation is not configured, HDLC is the default encapsulation.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Examples

The following example configures ATM-DXI encapsulation on serial interface 1:

```
interface serial 1
 encapsulation atm-dxi
```

Related Commands

Command	Description
class-int	Maps a protocol address to a given VPI and VCI.

framer-type

To set the framer type of supported circuit emulation service (CES) multiservice interchange (MIX) connections to T1 or E1, use the **framer-type** command in CES configuration mode.

framer-type {**t1** | **e1**}

Syntax Description

t1	Sets the framer type of supported CES connections to T1.
e1	Sets the framer type of supported CES connections to E1.

Defaults

T1

Command Modes

CES configuration

Command History

Release	Modification
12.1(5)XM	This command was introduced for the Cisco 3660.
12.2(4)T	This command was integrated into Cisco IOS Release 12.2(4)T.

Usage Guidelines

This command is needed only with CES-enabled network modules (ATM OC-3 CES network modules) that do *not* contain Cisco T1/E1 multiflex voice/WAN interface cards (VWICs) on the Cisco 3660. Other network modules set their framer type automatically and therefore do not require use of this command. It is also not necessary to use this command for T1 connections, because **t1** is the default argument.

To reach CES configuration mode for a particular slot, enter **ces** and the slot number and port number while in global configuration mode. Note that the port value is always 0, as the interface configuration applies to all ports in the slot.

Examples

The following example sets the framer type of the CES card in slot 1 to E1:

```
Router(config)# ces 1/0
Router(config-ces)# framer-type e1
```

Related Commands

Command	Description
ces	Configures CES on a router port and enters controller configuration mode.

holding-time

To specify the holding time value for the MPS-p7 variable of a Multiprotocol over ATM server (MPS), use the **holding-time** command in MPS configuration mode. To revert to the default value, use the **no** form of this command.

holding-time *seconds*

no holding-time *seconds*

Syntax Description

seconds	Specifies the holding time value in seconds. The default is 1200 seconds.

Defaults

The default holding time is 1200 seconds (20 minutes).

Command Modes

MPS configuration

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Examples

The following example shows how to set the holding time to 600 seconds (10 minutes):

```
holding-time 600
```

idle-timeout

To configure the idle timeout parameter for tearing down an ATM switched virtual circuit (SVC) connection, use the **idle-timeout** command in the appropriate command mode. To disable the timeout parameter, use the **no** form of this command.

idle-timeout *seconds* [*minimum-rate*]

no idle-timeout *seconds* [*minimum-rate*]

Syntax Description

seconds	Number of seconds that the SVC is idle, after which the ATM SVC is disconnected.
minimum-rate	(Optional) Minimum traffic rate, in kilobits per second (kbps), required on an ATM SVC to maintain the SVC connection.

Defaults

The default idle timeout is 300 seconds.
The default minimum rate is 0 kbps.

Command Modes

Interface-ATM-VC configuration (for ATM permanent virtual circuits [PVCs] or SVCs)
VC-class configuration (for virtual circuit [VC] classes)

Command History

Release	Modification
11.3	This command was introduced.

Usage Guidelines

If within the idle timeout period, both the input and output traffic rates are below the *minimum-rate*, the SVC connection is torn down. The input and output traffic rates are set using the **ubr**, **ubr+**, or **vbr-nrt** command.

If the **idle-timeout** command is not explicitly configured on an ATM SVC, the SVC inherits the following default configuration (listed in order of next highest precedence):

- Configuration of the **idle-timeout** command in a VC class assigned to the SVC itself.
- Configuration of the **idle-timeout** command in a VC class assigned to the SVC's ATM subinterface.
- Configuration of the **idle-timeout** command in a VC class assigned to the SVC's ATM main interface.
- Global default—The global idle timeout default is the value set using the **idle-timeout** interface configuration command. If the **idle-timeout** command is not configured, the default idle timeout is 300 seconds, and the *minimum-rate* is 0 kbps.

Examples

The following example configures an ATM SVC connection inactive after an idle period of 300 seconds. The SVC connection is also configured so that it is considered inactive if the traffic rate is less than 5 kbps.

```
idle-timeout 300 5
```

Related Commands

Command	Description
ubr	Selects UBR QoS and configures the output peak cell rate for an ATM PVC, SVC, or VC class.
ubr+	Selects UBR QoS and configures the output peak cell rate and output minimum guaranteed cell rate for an ATM PVC, SVC, or VC class.
vbr-nrt	Configures the VBR-NRT QoS and specifies output peak cell rate, output sustainable cell rate, and output maximum burst cell size for an ATM PVC, SVC, or VC class.

ilmi manage

To enable Integrated Local Management Interface (ILMI) management on an ATM permanent virtual circuit (PVC), use the **ilmi manage** command in the appropriate command mode. To disable ILMI management, use the **no** form of this command.

ilmi manage

no ilmi manage

Syntax Description

This command has no arguments or keywords.

Defaults

ILMI management is disabled.

Command Modes

Interface-ATM-VC configuration (for an ATM PVC)
VC-class configuration (for a virtual circuit [VC] class)
PVC range configuration (for an ATM PVC range)
PVC-in-range configuration (for an individual PVC within a PVC range)

Command History

Release	Modification
11.3 T	This command was introduced.
12.1(5)T	This command was made available in PVC range and PVC-in-range configuration modes.

Usage Guidelines

If the **ilmi manage** command is not explicitly configured on an ATM PVC, the PVC inherits the following default configuration (listed in order of precedence):

- Configuration of the **ilmi manage** command in a VC class assigned to the PVC itself.
- Configuration of the **ilmi manage** command in a VC class assigned to the PVC's ATM subinterface.
- Configuration of the **ilmi manage** command in a VC class assigned to the PVC's ATM main interface.
- Global default: ILMI management is disabled.

Examples

The following example enables ILMI management on the ATM PVC with VPI 0 and VCI 60. The ILMI PVC is assigned the name routerA and the VPI and VCI are 0 and 16, respectively.

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

ima active-links-minimum

To set the minimum number of links that must be operating in order for an ATM inverse multiplexing over ATM (IMA) group to remain in service, use the **ima active-links-minimum** interface configuration command. To remove the current configuration and set the value to the default, use the **no** form of this command.

ima active-links-minimum *number*

no ima active-links-minimum *number*

Syntax Description

number	Number of links; a value from 1 to 8.

Defaults

Links: 1

Command Modes

Interface configuration

Command History

Release	Modification
12.0(5)XK	This command was introduced on Cisco 2600 and 3600 series routers.
12.0(5)T	This command was integrated into Cisco IOS Release 12.0(5)T.
12.0(5)XE	Support for Cisco 7200 and 7500 series routers was added.
12.0(7)XE1	Support for Cisco 7100 series routers was added.
12.1(5)T	Support for Cisco 7100, 7200, and 7500 series routers was integrated into Cisco IOS Release 12.1(5)T.

Usage Guidelines

The minimum number of links that should be active for continued group operation depends upon the applications you are using and the speeds they require. ATM frame size and the number of links in a group affect the overhead required by ATM.

Examples

The following example specifies that two links in IMA group 2 must be operational in order for the group to remain in service:

```
interface atm 0/ima2
 ima active-links-minimum 2
```

Related Commands

Command	Description
interface atm ima	Configures an ATM IMA group.

ima clock-mode

To set the transmit clock mode for an ATM inverse multiplexing over ATM (IMA) group, use the **ima clock-mode** command in interface configuration mode. To remove the current configuration, use the **no** form of this command.

ima clock-mode {**common** *port* | **independent**}

no ima clock-mode

Syntax Description

common	Sets the transmit clocks for all the links in the group to be derived from the same source.
port	Link that will provide clocking for the IMA group (called the command link). If the common link fails, the system automatically chooses one of the remaining active links to provide clocking.
independent	Sets the transmit clock source for at least one link in the IMA group to be different from the clock source used by the other links.

Defaults

The default value is **common**. If no port is specified, the system automatically chooses an active link to provide clocking.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(5)XK	This command was introduced on Cisco 2600 and 3600 series routers.
12.0(5)T	This command was integrated into Cisco IOS Release 12.0(5)T
12.0(5)XE	This command was implemented on Cisco 7200 and 7500 series routers.
12.0(7)XE1	This command was implemented on Cisco 7100 series routers.
12.1(5)T	Support for Cisco 7100, 7200, and 7500 series routers was implemented in Cisco IOS Release 12.1(5)T.

Usage Guidelines

This command controls the clock for the IMA group as a whole. If all the links in the group share a clock source, use the **common** keyword. If all the links use different clock sources, use the **independent** clock source keyword.

When the **common** keyword is set, the **clock source** ATM interface configuration command for the common link determines clocking for all the links in the group.When the **independent** keyword is set, the **clock source** ATM interface configuration command is used under each interface to determine clocking individually.

Because the system automatically chooses a replacement for the common link when it fails, any link in an IMA group potentially can provide the recovered transmit clock. For this reason, even when the common keyword is set with a specific link stipulated by the port value, you should use the ATM interface configuration **clock source** command to make sure that the clock source is configured correctly on each interface in the IMA group.

Examples

The following example specifies that the links in IMA group 2 use a common clock source on link 0:

```
interface atm0/ima2
 ima clock-mode common 0
```

Related Commands

Command	Description
clock source	Configures the clock source of a DS1 link.
interface atm ima	Configures an ATM IMA group.
show ima interface atm	Provides information about all configured IMA groups or a specific IMA group.

ima differential-delay-maximum

To specify the maximum differential delay among the active links in an inverse multiplexing over ATM (IMA) group, use the **ima differential-delay-maximum** command in interface configuration mode. To restore the default setting, use the **no** form of this command.

ima differential-delay-maximum *milliseconds*

no ima differential-delay-maximum *milliseconds*

Syntax Description

msec	Specifies the differential delay in milliseconds (ms). The range of values depends on the type of card used. PA-A3-8T1IMA—25 to 250 milliseconds PA-A3-8E1IMA—25 to 190 milliseconds NM-8T1-IMA—25 to 200 milliseconds

Defaults

25 milliseconds

Command Modes

Interface configuration

Command History

Release	Modification
12.0(5)XK	This command was introduced on Cisco 2600 and 3600 series routers.
12.0(5)T	This command was integrated into Cisco IOS Release 12.0(5)T.
12.0(5)XE	This command was implemented on Cisco 7200 and 7500 series routers.
12.0(7)XE1	This command was implemented on Cisco 7100 series routers.
12.1(5)T	Support for Cisco 7100, 7200, and 7500 series routers was implemented in Cisco IOS Release 12.1(5)T.

Usage Guidelines

This command helps control latency in ATM-layer traffic by setting a limit on how much latency the slowest link in the group is allowed to introduce (a slower link has a longer propagation delay—for example, due to a longer path through the network or less accurate physical layer clocking—than other links). Setting a high value allows a slow link to continue operating as part of the group, although such a setting means there is added delay to links across the group. A low setting may result in less latency for traffic across the group than a high setting, but it can mean that the system takes a slow link out of operation, reducing total bandwidth.

When a link has been removed from service, it is automatically placed back in service when it meets the delay differential standard. If a link delay exceeds the specified maximum, the link is dropped; otherwise, the IMA feature adjusts for differences in delays so that all links in a group are aligned and carry ATM-layer traffic.

Examples

The following example specifies that the links in IMA group 2 have a maximum differential delay of 50 ms:

```
interface atm0/ima2
 ima differential-delay-maximum 50
```

Related Commands

Command	Description
show ima interface atm	Provides information about all configured IMA groups or a specific IMA group.

ima frame-length

To specify the number of cells in inverse multiplexing over ATM (IMA) frames, use the **ima frame-length** interface configuration command. To remove the current setting and restore the default value, use the **no** form of this command.

ima frame-length {**32** | **64** | **128** | **256**}

no ima frame-length {**32** | **64** | **128** | **256**}

Syntax Description

32	Specifies a value of 32 cells.
64	Specifies a value of 64 cells.
128	Specifies a value of 128 cells.
256	Specifies a value of 256 cells.

Defaults

The default value is 128 cells in a frame.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(5)XE	This command was introduced.
12.0(7)XE1	Support for Cisco 7100 series routers added.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.

Usage Guidelines

IMA frames are numbered sequentially, and each contains an IMA Control Protocol (ICP) cell at a specific position.

Frame length can affect performance because the greater the total number of frames required to communicate a given number of cells, the greater the overhead for header and other control cells. In addition, shorter frame lengths might diminish performance when translated ATM-Frame Relay interworking occurs.

Examples

On Cisco 7100 and 7200 series routers, the following example specifies that the links in IMA group 2 have a frame length of 64 cells:

```
interface atm 1/ima2
 ima frame-length 64
```

ima test

To specify an interface and test pattern for verifying connectivity of all links in an inverse multiplexing over ATM (IMA) group, use the **ima test** command in interface configuration mode. To stop the test, use the **no** form of this command.

ima test [**link** *port*] [**pattern** *pattern-id*]

no ima test [**link** *port*] [**pattern** *pattern-id*]

Syntax Description

link *port*	(Optional) The identifier for the interface where the physical link is located.
pattern *pattern-id*	(Optional) A value from 0 to 254, set in hexadecimal or decimal numbers, identifying a pattern to be sent to the far end of the link.

Defaults

There is no default for the *port* value. The default value for *pattern-id* is 106 (0x6A).

Command Modes

Interface configuration

Command History

Release	Modification
12.0(5)XK	This command was introduced on Cisco 2600 and 3600 series routers.
12.0(5)T	This command was integrated into Cisco IOS 12.0(5)T.
12.0(5)XE	Support for Cisco 7200 and 7500 series routers was added.
12.0(7)XE1	Support for Cisco 7100 series routers was added.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.

Usage Guidelines

To verify link and group connectivity, the pattern is sent from the specified link and looped back from the receiving end across all links belonging to the group as defined at the remote end. Verifying link and group connectivity can help troubleshoot physical link connectivity or configuration problems at the remote end. The local end verifies that the pattern is returned on all links belonging to the group at the local end, and testing is continuous. An IMA control protocol (ICP) cell in each frame identifies the pattern.

When a link is not transmitting or receiving a pattern correctly, the command reports the link number where the problem exists.

Examples

The following example configures link 4 to send test pattern 56:

```
interface atm 0/ima 2
 ima test link 2 pattern 56
```

Related Commands

Command	Description
show ima interface atm	Provides information about all configured IMA groups or a specific IMA group.

ima-group

To define physical links as inverse multiplexing over ATM (IMA) group members, use the **ima-group** command in interface configuration mode for each group member. To remove the port from the group, use the **no** form of this command.

ima-group *group-number*

no ima-group *group-number*

Syntax Description

group-number	Specifies an IMA group number from 0 to 3. IMA groups can span multiple ports on a port adapter but cannot span port adapters.

Defaults

Physical links are not included in IMA groups.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(5)XK	This command was introduced on Cisco 2600 and 3600 series routers.
12.0(5)T	This command was integrated into Cisco IOS 12.0(5)T.
12.0(5)XE	Support for Cisco 7200 and 7500 series routers was added.
12.0(7)XE1	Support for Cisco 7100 series routers was added.
12.1(5)T	Support for Cisco 7100, 7200, and 7500 series routers was integrated into Cisco IOS Release 12.1(5)T.

Usage Guidelines

When the configuration is first performed or when the group number is changed, the interface is automatically disabled, moved to the new group, and then enabled.

Examples

The following example makes interface 1 on the ATM module in slot 0 a member of IMA group 2:

```
interface atm0/1
 ima-group 2
```

Related Commands

Command	Description
interface atm	Configures an ATM interface.
interface atm ima	Configures an ATM IMA group.
show ima interface atm	Provides information about all configured IMA groups or a specific IMA group.
shutdown (interface)	Disables an interface.

inarp

To configure the Inverse Address Resolution Protocol (ARP) time period for an ATM permanent virtual circuit (PVC), virtual circuit (VC) class, or VC bundle, use the **inarp** command in the appropriate command mode. To restore the default Inverse ARP time period behavior, use the **no** form of this command.

inarp *minutes*

no inarp *minutes*

Syntax Description

minutes	Number of minutes for the Inverse ARP time period.

Defaults

minutes: 15 minutes.

Command Modes

Interface-ATM-VC configuration (for an ATM PVC)
VC-class configuration (for a VC class)
Bundle configuration (for a VC bundle)
PVC range configuration (for an ATM PVC range)
PVC-in-range configuration (for an individual PVC within a PVC range)

Command History

Release	Modification
11.3 T	This command was introduced.
12.0(3)T	This command was enhanced to provide support to configure the Inverse ARP time period for an ATM VC bundle.
12.1(5)T	This command was made available in PVC range and PVC-in-range configuration modes.

Usage Guidelines

This command is supported for **aal5snap** encapsulation only when Inverse ARP is enabled. Refer to the **encapsulation** command for configuring **aal5snap** encapsulation and the **protocol** command for enabling Inverse ARP.

If the **inarp** command is not explicitly configured on an ATM PVC, the PVC inherits the following default configuration (listed in order of precedence):

- Configuration of the **inarp** command in a VC class assigned to the PVC itself.
- Configuration of the **inarp** command in a VC class assigned to the PVC's ATM subinterface.
- Configuration of the **inarp** command in a VC class assigned to the PVC's ATM main interface.
- Global default for the *minutes* argument is 15 minutes; this default assumes that Inverse ARP is enabled.

Note As the inheritance rules imply, when a VC is a member of a VC bundle, configuration using the **inarp** command in VC-class configuration mode no longer applies to that VC. Bundle configuration takes precedence.

For ATM VC bundle management, the Inverse ARP parameter can only be enabled at the bundle level and applied to all VC members of the bundle—that is, it cannot be enabled in bundle-vc configuration mode for individual VC bundle members. To use this command in bundle configuration mode, first enter the **bundle** command to create the bundle and enter bundle configuration mode.

Examples

The following example sets the Inverse ARP time period to 10 minutes:

```
inarp 10
```

Related Commands

Command	Description
bundle	Creates a bundle or modifies an existing bundle to enter bundle configuration mode.
broadcast	Configures broadcast packet duplication and transmission for an ATM VC class, PVC, SVC, or VC bundle.
class-int	Assigns a VC class to an ATM main interface or subinterface.
class-vc	Assigns a VC class to an ATM PVC, SVC, or VC bundle member.
encapsulation atm-dxi	Configures the AAL and encapsulation type for an ATM PVC, SVC, or VC class.
oam-bundle	Enables end-to-end F5 OAM loopback cell generation and OAM management for a virtual circuit class that can be applied to a virtual circuit bundle.
oam retry	Configures parameters related to OAM management for an ATM PVC, SVC, VC class, or VC bundle.
protocol (ATM)	Configures a static map for an ATM PVC, SVC, VC class, or VC bundle. Enables Inverse ARP or Inverse ARP broadcasts on an ATM PVC by either configuring Inverse ARP directly on the PVC, on the VC bundle, or in a VC class (applies to IP and IPX protocols only).

inarp-vc

To enable Inverse Address Resolution Protocol (InARP) for a permanent virtual circuit (PVC) bundle member, use the **inarp-vc** command in ATM VC bundle-member configuration mode. To disable InARP for a PVC bundle member, use the **no** form of this command.

inarp-vc

no inarp-vc

Syntax Description

This command has no arguments or keywords.

Command Default

InARP is disabled for the PVC bundle member.

Command Modes

ATM VC bundle-member configuration

Command History

Release	Modification
12.4(4)T	This command was introduced.

Usage Guidelines

You can use this command only when using the quality of service (QoS) group method for selecting the PVC bundle members. When InARP is enabled for a PVC bundle member, InARP requests are sent and are expected to be received on the PVC bundle member, and InARP replies are expected to be received on the PVC bundle member.

Examples

The following example associates QoS group 1 with a PVC bundle member and enables InARP on the PVC bundle member:

```
Router> enable
Password:
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface atm 2/0
Router(config-subif)# bundle cisco
Router(config-if-atm-bundle)# selection-method qos-group
Router(config-if-atm-bundle)# pvc 1/32
Router(config-if-atm-member)# qos-group 1
Router(config-if-atm-member)# inarp-vc
Router(config-if-atm-member)# end
```

Related Commands

Command	Description
qos-group (ATM VC bundle member)	Associates a QoS group or groups with a PVC bundle member.
selection-method	Specifies the method for selection of the PVC bundle member.

interface atm ima

To configure an inverse multiplexing over ATM (IMA) group, use the **interface atm ima** global configuration command.

interface atm *slot*/**ima***group-number*

Syntax Description

slot/	Specifies the slot location of the ATM IMA network module. The values range from 0 to 5 depending on the router.
group-number	Enter an IMA group number from 0 to 3. You can create up to four groups. Do not include a space before the group number.

Defaults

There are no IMA groups, only individual ATM links.

Command Modes

Global configuration

Command History

Release	Modification
12.0(5)XK	This command was introduced on Cisco 2600 and 3600 series routers.
12.0(5)T	This command was integrated into Cisco IOS 12.0(5)T.
12.0(5)XE	Support for Cisco 7200 and 7500 series routers was added.
12.0(7)XE1	Support for Cisco 7100 series routers was added.
12.1(5)T	Support for Cisco 7100, 7200, and 7500 series routers was integrated into Cisco IOS Release 12.1(5)T.

Usage Guidelines

If the group does not exist when the command is issued, the command automatically creates the group.

When a port is configured for IMA functionality, it no longer operates as an individual ATM link.

Specifying ATM links as members of a group by using the **ima group** interface command does not enable the group. You must use the **interface atm ima** command to create the group.

Examples

The following example configures IMA group 0 on the module in slot 1:

```
interface atm 1/ima0
  ip address 10.18.16.121 255.255.255.192
```

Related Commands

Command	Description
ima-group	Defines IMA group members.
interface atm	Configures an ATM interface.

Command	Description
show ima interface atm	Provides information about all configured IMA groups or a specific IMA group.
shutdown (interface)	Disables an interface.

interface atm

To configure an ATM interface and enter interface configuration mode, use the **interface atm** command in global configuration mode.

interface atm *interface-number*[**.***subinterface-number* {**mpls** | **multipoint** | **point-to-point**}]

Syntax Description

interface-number	Specifies a (physical) ATM interface (for example, 3/0).
.*subinterface-number*	(Optional) Specifies a subinterface number. A dot (.) must be used to separate the *interface-number* from the *subinterface-number* (for example 2/0.1).
mpls	(Optional) Specifies MPLS as the interface type for which a subinterface is to be created.
multipoint	(Optional) Specifies multipoint as the interface type for which a subinterface is to be created.
point-to-point	(Optional) Specifies point-to-point as the interface type for which a subinterface is to be created.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.
12.1(3)T	New optional subinterface types were introduced.

Usage Guidelines

The **interface atm** command enables you to define a subinterface for a specified type of ATM interface. The subinterface for the ATM interface is created the first time this command is issued with a specified subinterface number.

Examples

For physical ATM interface 3/0, the following command creates an ATM MPLS subinterface having subinterface number 1:

```
Router# interface atm 3/0.1 mpls
```

Related Commands

Command	Description
show interfaces atm	Displays information about the ATM interface.
show mpls interfaces	Displays information about one or more MPLS interfaces that have been configured for label switching.

interface cbr

To specify the T1 or E1 constant bit rate interface on an ATM-CES port adapter, and to enter interface configuration mode, use the **interface cbr** command in global configuration mode.

interface cbr *slot/port*

Syntax Description

slot/	Backplane slot number. The slash (/) must be typed.
port	Interface port number.

Defaults

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

The ATM-CES port adapter has four T1 (1.544 Mbps) or four E1 (2.048 Mbps) ports (75- or 120-ohm) that can support both structured (N x 64 kbps) and unstructured ATM Forum-compliant circuit emulation services (CES), and one port that supports an OC-3 (155 Mbps) single-mode intermediate reach interface or a T3 (45 Mbps) or E3 (34 Mbps) standards-based ATM interface.

Examples

The following example specifies the first T1 or E1 port on the ATM-CES port adapter in slot 1:

```
interface cbr 1/0
```

Related Commands

Command	Description
show ces interface cbr	Displays detailed CBR port information.
show interface cbr	Displays the information about the CBR interface on the ATM-CES port adapter.

keepalive-lifetime

To specify the duration that a keepalive message from a Multiprotocol over ATM server (MPS) is considered valid by the Multiprotocol over ATM client (MPC), use the **keepalive-lifetime** command in global configuration mode.

keepalive-lifetime *seconds*

Syntax Description

seconds	Time (in seconds) for the MPS-p2 variable of the MPS. The default value is 35 seconds.

Defaults

The default is 35 seconds.

Command Modes

Global configuration

Command History

Release	Modification
12.0(3)T	This command was introduced.

Usage Guidelines

The keepalive lifetime (MPS-p2) must be greater than or equal to three times the value of the keepalive time (MPS-p1). MPS-p1 specifies the frequency with which a keepalive message is sent from the MPS to the MPC.

Examples

The following example shows how to specify a keepalive lifetime of 60 seconds:

```
Router(config)# keepalive-lifetime 60
```

Related Commands

Command	Description
keepalive-time	Specifies the keepalive time value for the MPS-p1 variable of an MPS.

keepalive-time

To specify the keepalive time value for the Multiprotocol over ATM (MPOA) server (MPS)-p1variable of an MPS, use the **keepalive-time** command in MPS configuration mode. To revert to the default value, use the **no** form of this command.

keepalive-time *seconds*

no keepalive-time *seconds*

Syntax Description

seconds	Specifies the keepalive time value (in seconds). The default value is 10 seconds.

Defaults

The default keepalive time is 10 seconds.

Command Modes

MPS configuration

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Examples

The following example shows how to set the keepalive time to 25 seconds:

```
Router(mpoa-server-config)# keepalive-time 25
```

lane auto-config-atm-address

To specify that the configuration server ATM address is computed by the Cisco automatic method, use the **lane auto-config-atm-address** command in interface configuration mode. To remove the previously assigned ATM address, use the **no** form of this command.

lane [**config**] **auto-config-atm-address**

no lane [**config**] **auto-config-atm-address**

Syntax Description

config	(Optional) When the **config** keyword is used, this command applies only to the LAN Emulation Configuration Server (LECS). This keyword indicates that the LECS should use the auto computed LECS address.

Defaults

No specific ATM address is set.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

When the **config** keyword is not present, this command causes the LANE server and LANE client on the subinterface to use the automatically assigned ATM address for the configuration server.

When the **config** keyword is present, this command assigns the automatically generated ATM address to the configuration server (LECS) configured on the interface. Multiple commands that assign ATM addresses to the LANE configuration server can be issued on the same interface to assign different ATM addresses to the configuration server. Commands that assign ATM addresses to the LANE configuration server include **lane auto-config-atm-address**, **lane config-atm-address**, and **lane fixed-config-atm-address**.

For a discussion of Cisco's method of automatically assigning ATM addresses, refer to the "Configuring LAN Emulation" chapter in the *Cisco IOS Switching Services Configuration Guide.*

Examples

The following example shows how to associate the LANE configuration server with the database named network1 and specifies that the configuration server's ATM address will be assigned by the Cisco automatic method:

```
Router(config)# lane database network1
Router(lane-config-dat)# name eng server-atm-address
39.020304050607080910111213.0800.AA00.1001.02
Router(lane-config-dat)# name mkt server-atm-address
39.020304050607080910111213.0800.AA00.4001.01

Router(config)# interface atm 1/0
```

```
Router(config-if)# lane config database network1
Router(config-if)# lane config auto-config-atm-address
```

The following example shows how to cause the LANE server and LANE client on the subinterface to use the automatically assigned ATM address to communicate with the configuration server:

```
Router(config)# interface atm 2/0.1
Router(config-if)# ip address 172.16.0.4 255.255.255.0
Router(config-if)# lane client ethernet
Router(config-if)# lane server-bus ethernet eng
Router(config-if)# lane auto-config-atm-address
```

Related Commands

Command	Description
lane config-atm-address	Specifies the ATM address of the configuration server explicitly.
lane database	Creates a named configuration database that can be associated with a configuration server.
lane fixed-config-atm-address	Specifies that the fixed configuration server ATM address assigned by the ATM Forum will be used.

lane bus-atm-address

To specify an ATM address—and thus override the automatic ATM address assignment—for the broadcast and unknown server on the specified subinterface, use the **lane bus-atm-address** command in interface configuration mode. To remove the ATM address previously specified for the broadcast and unknown server on the specified subinterface and thus revert to the automatic address assignment, use the **no** form of this command.

lane bus-atm-address *atm-address-template*

no lane bus-atm-address [*atm-address-template*]

Syntax Description

atm-address-template	ATM address or a template in which wildcard characters are replaced by any nibble or group of nibbles of the prefix bytes, the end-system identifier (ESI) bytes, or the selector byte of the automatically assigned ATM address.

Defaults

For the broadcast and unknown server, the default is automatic ATM address assignment.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

When applied to a broadcast and unknown server, this command overrides automatic ATM address assignment for the broadcast and unknown server. When applied to a LANE client, this command gives the client the ATM address of the broadcast and unknown server. The client will use this address rather than sending LAN Emulation Address Resolution Protocol (LE ARP) requests for the broadcast address.

When applied to a selected interface, but with a different ATM address from what was used previously, this command replaces the broadcast and unknown server's ATM address.

ATM Addresses

A LANE ATM address has the same syntax as a network service access point (NSAP) (but it is not a network-level address). It consists of the following:

- A 13-byte prefix that includes the following fields defined by the ATM Forum:
  - AFI (Authority and Format Identifier) field (1 byte)
  - DCC (Data Country Code) or ICD (International Code Designator) field (2 bytes)
  - DFI field (Domain Specific Part Format Identifier) (1 byte)
  - Administrative Authority field (3 bytes)
  - Reserved field (2 bytes)
  - Routing Domain field (2 bytes)

  - Area field (2 bytes)
- A 6-byte ESI
- A 1-byte selector field

Address Templates

LANE ATM address templates can use two types of wildcards: an asterisk (*) to match any single character (nibble), and an ellipsis (...) to match any number of leading, middle, or trailing characters. The values of the characters replaced by wildcards come from the automatically assigned ATM address.

The values of the digits that are replaced by wildcards come from the automatic ATM assignment method.

In LANE, a *prefix template* explicitly matches the prefix but uses wildcards for the ESI and selector fields. An *ESI template* explicitly matches the ESI field but uses wildcards for the prefix and selector.

In the Cisco implementation of LANE, the prefix corresponds to the switch, the ESI corresponds to the ATM interface, and the selector field corresponds to the specific subinterface of the interface.

Examples

The following example shows how to use an ESI template to specify the part of the ATM address corresponding to the interface; the remaining values in the ATM address come from automatic assignment:

```
Router(config-if)# lane bus-atm-address ...0800.200C.1001.**
```

The following example shows how to use a prefix template to specify the part of the ATM address corresponding to the switch; the remaining values in the ATM address come from automatic assignment:

```
Router(config-if)# lane bus-atm-address 45.000014155551212f.00.00...
```

Related Commands

Command	Description
lane server-bus	Enables a LANE server and a broadcast and unknown server on the specified subinterface with the ELAN ID.

lane client flush

To enable the flush mechanism of a LAN Emulation Client (LEC), use the **lane client flush** command in global configuration mode. To disable the flush mechanism of a LEC, use the **no** form of this command.

lane client flush

no lane client flush

Syntax Description

This command contains no arguments or keywords.

Defaults

All the LECs perform the LANE LE_FLUSH process by default.

Command Modes

Global configuration

Command History

Release	Modification
12.1(2)T	This command was introduced.

Usage Guidelines

In Cisco IOS Release 12.1(3)T and later releases, the **lane client flush** command will be hidden and will not be visible in the configuration.

Configuring the **no lane client flush** command on a Cisco networking device is recommended to prevent the initial packet drops during the establishment of LANE data direct virtual connection (VCC).

Use the **no lane client flush** command to keep LANE clients from sending LE_FLUSH messages to the remote LANE client. This configuration also allows the LANE clients to process the LE_FLUSH messages from the remote LANE clients.

Note Configuring the **no lane client flush** command on a Cisco networking device does not guarantee the orderly delivery of incoming packets. There is a chance of receiving out-of-order packets at the destination during the establishment of a LANE data direct VCC.

Examples

The following example shows how to disable the flush mechanism of a LEC:

```
Router(config)# no lane client flush
```

Related Commands

Command	Description
lane client	Activates a LANE client on the specified subinterface.
lane client-atm-address	Specifies an ATM address—and thus overrides the automatic ATM address assignment—for the LANE client on the specified subinterface.

lane client mpoa client name

To bind a LAN Emulation Client (LEC) to the named Multiprotocol over ATM client (MPC), use the **lane client mpoa client name** command in interface configuration mode. To unbind the named MPC from a LEC, use the **no** form of this command.

lane client mpoa client name *mpc-name*

no lane client mpoa client name *mpc-name*

Syntax Description

mpc-name	Name of the specific MPC.

Defaults

No LEC is bound to a named MPC.

Command Modes

Interface configuration

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Usage Guidelines

When you enter this command, the named MPC is bound to a LEC. The named MPC must exist before this command is accepted. If you enter this command before a LEC is configured (not necessarily running), a warning message is issued.

Examples

The following example shows how to bind a LEC on a subinterface to the MPC:

```
Router(config-if)# lane client mpoa client name ip_mpc
```

lane client mpoa server name

To bind a LAN Emulation Client (LEC) with the named Multiprotocol over ATM server (MPS), use the **lane client mpoa server name** command in interface configuration mode. To unbind the server, use the **no** form of this command.

lane client mpoa server name *mps-name*

no lane client mpoa server name *mps-name*

Syntax Description

mps-name	Name of the specific MPS.

Defaults

No LEC is bound to a named MPS.

Command Modes

Interface configuration

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Usage Guidelines

This command binds a LEC to the named MPS. The specified MPS must exist before this command is accepted. If this command is entered when a LEC is not already configured (not necessarily running), a warning message will be issued.

Examples

The following example shows how to bind a LANE client with the MPS named MYMPS:

```
Router(config-if)# lane client mpoa server name MYMPS
```

lane client

To activate a LAN Emulation (LANE) client on the specified subinterface, use the **lane client** command in interface configuration mode. To remove a previously activated LANE client on the subinterface, use the **no** form of this command.

lane client {**ethernet**} [*elan-name*]

no lane client {**ethernet**} [*elan-name*]

Syntax Description

ethernet	Identifies the emulated LAN (ELAN) attached to this subinterface as an Ethernet ELAN.
elan-name	(Optional) Name of the ELAN. This argument is optional because the client obtains its ELAN name from the configuration server. The maximum length of the name is 32 characters.

Defaults

No LANE clients are enabled on the interface.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.
12.3(2)T	The **tokenring** keyword was removed.

Usage Guidelines

If a **lane client** command has already been used on the subinterface for a different ELAN, then the client initiates termination procedures for that ELAN and joins the new ELAN.

If you do not provide an *elan-name* value, the client contacts the server to find which ELAN to join. If you do provide an ELAN name, the client consults the configuration server to ensure that no conflicting bindings exist.

Examples

The following example shows how to enable an Ethernet LANE client on an interface:

```
Router(config-if)# lane client ethernet
```

Related Commands

Command	Description
lane client-atm-address	Specifies an ATM address—and thus overrides the automatic ATM address assignment—for the LANE client on the specified subinterface.

lane client-atm-address

To specify an ATM address—and thus override the automatic ATM address assignment—for the LAN Emulation (LANE) client on the specified subinterface, use the **lane client-atm-address** command in interface configuration mode. To remove the ATM address previously specified for the LANE client on the specified subinterface and thus revert to the automatic address assignment, use the **no** form of this command.

lane client-atm-address *atm-address-template*

no lane client-atm-address [*atm-address-template*]

Syntax Description

atm-address-template	ATM address or a template in which wildcard characters are replaced by any nibble or group of nibbles of the prefix bytes, the end-system identifier (ESI) bytes, or the selector byte of the automatically assigned ATM address.

Defaults

Automatic ATM address assignment

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

Use of this command on a selected subinterface, but with a different ATM address from what was used previously, replaces the ATM address of the LANE client.

ATM Addresses

A LANE ATM address has the same syntax as a network service access point (NSAP) (but it is not a network-level address). It consists of the following:

- A 13-byte prefix that includes the following fields defined by the ATM Forum:
  - AFI (Authority and Format Identifier) field (1 byte)
  - DCC (Data Country Code) or ICD (International Code Designator) field (2 bytes)
  - DFI field (Domain Specific Part Format Identifier) (1 byte)
  - Administrative Authority field (3 bytes)
  - Reserved field (2 bytes)
  - Routing Domain field (2 bytes)
  - Area field (2 bytes)
- A 6-byte ESI
- A 1-byte selector field

Address Templates

LANE ATM address templates can use two types of wildcards: an asterisk (*) to match any single character (nibble), and an ellipsis (...) to match any number of leading, middle, or trailing characters. The values of the characters replaced by wildcards come from the automatically assigned ATM address.

In LANE, a *prefix template* explicitly matches the ATM address prefix but uses wildcards for the ESI and selector fields. An *ESI template* explicitly matches the ESI field but uses wildcards for the prefix and selector.

The Cisco implementation of LANE, the prefix corresponds to the switch, the ESI corresponds to the ATM interface, and the selector field corresponds to the specific subinterface of the interface.

For a discussion of Cisco's method of automatically assigning ATM addresses, refer to the "Configuring LAN Emulation" chapter in the *Cisco IOS Switching Services Configuration Guide*.

Examples

The following example shows how to use an ESI template to specify the part of the ATM address corresponding to the interface; the remaining parts of the ATM address come from automatic assignment:

```
Router(config-if)# lane client-atm-address...0800.200C.1001.**
```

The following example shows how to use a prefix template to specify the part of the ATM address corresponding to the switch; the remaining parts of the ATM address come from automatic assignment:

```
Router(config-if)# lane client-atm-address 47.000014155551212f.00.00...
```

Related Commands

Command	Description
lane client	Activates a LANE client on the specified subinterface.

lane config database

To associate a named configuration table (database) with the configuration server on the selected ATM interface, use the **lane config database** command in interface configuration mode. To remove the association between a named database and the configuration server on the specified interface, use the **no** form of this command.

lane config database *database-name*

no lane config database

Syntax Description

database-name	Name of the LAN emulation (LANE) database.

Defaults

No configuration server is defined, and no database name is provided.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

This command is valid only on a major interface, not a subinterface, because only one LANE Configuration Server (LECS) can exist per interface.

The named database must exist before the **lane config database** command is used. Refer to the **lane database** command for more information.

Multiple **lane config database** commands cannot be used multiple times on the same interface. You must delete an existing association by using the **no** form of this command before you can create a new association on the specified interface.

Activating a LANE configuration server requires the **lane config database** command and one of the following commands: **lane fixed-config-atm-address**, **lane auto-config-atm-address**, or **lane config-atm-address**.

Examples

The following example shows how to associate the LECS with the database named network1 and to specify that the configuration server's ATM address will be assigned by the Cisco automatic method:

```
Router(config)# lane database network1
Router(lane-config-dat)# name eng server-atm-address
39.020304050607080910111213.0800.AA00.1001.02
Router(lane-config-dat)# name mkt server-atm-address
39.020304050607080910111213.0800.AA00.4001.01
Router(config)# interface atm 1/0
Router(config-if)# lane config database network1
Router(config-if)# lane config auto-config-atm-address
```

Related Commands

Command	Description
lane auto-config-atm-address	Specifies that the configuration server ATM address is computed by the Cisco automatic method.
lane config-atm-address	Specifies the ATM address of the configuration server explicitly.
lane database	Creates a named configuration database that can be associated with a configuration server.
lane fixed-config-atm-address	Specifies that the fixed configuration server ATM address assigned by the ATM Forum will be used.

lane config-atm-address

To specify a configuration server's ATM address explicitly, use the **lane config-atm-address** command in interface configuration mode. To remove an assigned ATM address, use the **no** form of this command.

lane [**config**] **config-atm-address** *atm-address-template*

no lane [**config**] **config-atm-address** *atm-address-template*

Syntax Description

config	(Optional) When the **config** keyword is used, this command applies only to the LANE Configuration Server (LECS). This keyword indicates that the LECS should use the 20-byte address that you explicitly entered.
atm-address-template	ATM address or a template in which wildcard characters are replaced by any nibble or group of nibbles of the prefix bytes, the end-system identifier (ESI) bytes, or the selector byte of the automatically assigned ATM address.

Defaults

No specific ATM address or method is set.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

If the **config** keyword is not present, this command causes the LAN Emulation (LANE) server and LANE client on the subinterface to use the specified ATM address for the configuration server.

When the **config** keyword is present, this command adds an ATM address to the configuration server configured on the interface. A LECS can listen on multiple ATM addresses. Multiple commands that assign ATM addresses to the LECS can be issued on the same interface to assign different ATM addresses to the LECS.

ATM Addresses

A LANE ATM address has the same syntax as an NSAP (but it is not a network-level address). It consists of the following:

- A 13-byte prefix that includes the following fields defined by the ATM Forum:
  - AFI (Authority and Format Identifier) field (1 byte)
  - DCC (Data Country Code) or ICD (International Code Designator) field (2 bytes)
  - DFI field (Domain Specific Part Format Identifier) (1 byte)
  - Administrative Authority field (3 bytes)
  - Reserved field (2 bytes)

  - Routing Domain field (2 bytes)
  - Area field (2 bytes)
- A 6-byte ESI
- A 1-byte selector field

Address Templates

LANE ATM address templates can use two types of wildcards: an asterisk (*) to match any single character (nibble), and an ellipsis (...) to match any number of leading, middle, or trailing characters. The values of the characters replaced by wildcards come from the automatically assigned ATM address.

In LANE, a *prefix template* explicitly matches the ATM address prefix but uses wildcards for the ESI and selector fields. An *ESI template* explicitly matches the ESI field but uses wildcards for the prefix and selector.

In our implementation of LANE, the prefix corresponds to the switch prefix, the ESI corresponds to a function of the ATM interface's MAC address, and the selector field corresponds to the specific subinterface of the interface.

For a discussion of the Cisco method of automatically assigning ATM addresses, refer to the "Configuring LAN Emulation" chapter in the *Cisco IOS Switching Services Configuration Guide*.

Examples

The following example shows how to associate the LANE configuration server with the database named network1 and to explicitly specify the configuration server's ATM address:

```
Router(config)# lane database network1
Router(lane-config-dat)# name eng server-atm-address
39.020304050607080910111213.0800.AA00.1001.02
Router(lane-config-dat)# name mkt server-atm-address
39.020304050607080910111213.0800.AA00.4001.01

Router(config)# interface atm 1/0
Router(config-if)# lane config database network1
Router(config-if)# lane config config-atm-address
39.020304050607080910111213.0800.AA00.3000.00
```

The following example shows how to cause the LANE server and LANE client on the subinterface to use the explicitly specified ATM address to communicate with the configuration server:

```
Router(config)# interface atm 2/0.1
Router(config-if)# ip address 172.16.0.4 255.255.255.0
Router(config-if)# lane client ethernet
Router(config-if)# lane server-bus ethernet eng
Router(config-if)# lane config-atm-address 39.020304050607080910111213.0800.AA00.3000.00
```

Related Commands

Command	Description
lane auto-config-atm-address	Specifies that the configuration server ATM address is computed by the Cisco automatic method.
lane config database	Associates a named configuration table (database) with the configuration server on the selected ATM interface.
lane database	Creates a named configuration database that can be associated with a configuration server.
lane fixed-config-atm-address	Specifies that the fixed configuration server ATM address assigned by the ATM Forum will be used.

lane database

To create a named configuration database that can be associated with a configuration server, use the **lane database** command in global configuration mode. To delete the database, use the **no** form of this command.

lane database *database-name*

no lane database *database-name*

Syntax Description

database-name	Database name (32 characters maximum).

Defaults

No name is provided.

Command Modes

Global configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

Use of the **lane database** command places you in database configuration mode, in which you can use the **client-atm-address name, default name, mac-address name, name restricted, name unrestricted, name new-name,** and **name server-atm-address** commands to create entries in the specified database. When you are finished creating entries, type **^Z** or **exit** to return to global configuration mode.

Examples

The following example shows how to create the database named network1 and associates it with the configuration server on interface ATM 1/0:

```
Router(config)# lane database network1
Router(lane-config-dat)# name eng server-atm-address
39.020304050607080910111213.0800.AA00.1001.02
Router(lane-config-dat)# name mkt server-atm-address
39.020304050607080910111213.0800.AA00.4001.01
Router(lane-config-dat)# default-name eng

Router(config)# interface atm 1/0
Router(config-if)# lane config database network1
Router(config-if)# lane config auto-config-atm-address
```

Related Commands

Command	Description
client-atm-address name	Adds a LANE client address entry to the configuration database of the configuration server.
default-name	Provides an ELAN name in the database of the configuration server for those client MAC addresses and client ATM addresses that do not have explicit ELAN name bindings.
lane config database	Associates a named configuration table (database) with the configuration server on the selected ATM interface.
mac-address	Sets the MAC-layer address of the Cisco Token Ring.
name	Assigns a name to the internal adapter.
name server-atm-address	Specifies or replaces the ATM address of the LANE server for the ELAN in the configuration database of the configuration server.

lane fixed-config-atm-address

To specify that the fixed configuration server ATM address assigned by the ATM Forum will be used, use the **lane fixed-config-atm-address** command in interface configuration mode. To specify that the fixed ATM address will not be used, use the **no** form of this command.

lane [**config**] **fixed-config-atm-address**

no lane [**config**] **fixed-config-atm-address**

Syntax Description

config	(Optional) When the **config** keyword is used, this command applies only to the LANE Configuration Server (LECS). This keyword indicates that LECS should use the well-known, ATM Forum LEC address.

Defaults

No specific ATM address or method is set.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

When the **config** keyword is not present, this command causes the LAN emulation (LANE) server and LANE client on the subinterface to use that ATM address, rather than the ATM address provided by the ILMI, to locate the configuration server.

When the **config** keyword is present, and the LECS is already up and running, be aware of the following scenarios:

- If you configure the LECS with only the well-known address, the LECS will not participate in the SSRP, will act as a standalone master, and will listen only on the well-known LECS address. This scenario is ideal if you want a standalone LECS that does not participate in SSRP, and you would like to listen to only the well-known address.
- If only the well-known address is already assigned, and you assign at least one other address to the LECS (additional addresses are assigned using the **lane auto-config-atm-address** command or the **lane config-atm-address** command), the LECS will participate in the SSRP and act as the master or slave based on the normal SSRP rules. This scenario is ideal if you would like the LECS to participate in SSRP, and you would like to make the master LECS listen on the well-known address.
- If the LECS is participating in SSRP, has more than one address (one of which is the well-known address), and all the addresses but the well-known address are removed, the LECS will declare itself the master and stop participating in SSRP completely.
- If the LECS is operating as an SSRP slave, and it has the well-known address configured, it will not listen on the well-known address unless it becomes the master.
- If you want the LECS to assume the well-known address only when it becomes the master, configure the LECS with the well-known address and at least one other address.

When you use this command with the **config** keyword, and the LECS is a master, the master will listen on the fixed address. If you use this command when an LECS is not a master, the LECS will listen on this address when it becomes a master. If you do not use this command, the LECS will not listen on the fixed address.

Multiple commands that assign ATM addresses to the LECS can be issued on the same interface in order to assign different ATM addresses to the LECS. Commands that assign ATM addresses to the LECS include **lane auto-config-atm-address, lane config-atm-address**, and **lane fixed-config-atm-address**. The **lane config database** command and at least one command that assigns an ATM address to the LECS are required to activate a LECS.

Examples

The following example shows how to associate the LECS with the database named network1 and how to specify that the configuration server's ATM address is the fixed address:

```
Router(config)# lane database network1
Router(lane-config-dat)# name eng server-atm-address
39.020304050607080910111213.0800.AA00.1001.02
Router(lane-config-dat)# name mkt server-atm-address
39.020304050607080910111213.0800.AA00.4001.01

Router(config)# interface atm 1/0
Router(config-if)# lane config database network1
Router(config-if)# lane config fixed-config-atm-address
```

The following example shows how to cause the LANE server and LANE client on the subinterface to use the fixed ATM address to communicate with the configuration server:

```
Router(config)# interface atm 2/0.1
Router(config-if)# ip address 172.16.0.4 255.255.255.0
Router(config-if)# lane client ethernet
Router(config-if)# lane server-bus ethernet eng
Router(config-if)# lane fixed-config-atm-address
```

Related Commands

Command	Description
lane auto-config-atm-address	Specifies that the configuration server ATM address is computed by the Cisco automatic method.
lane config-atm-address	Specifies the ATM address of the configuration server explicitly.
lane config database	Associates a named configuration table (database) with the configuration server on the selected ATM interface.

lane fssrp

To enable the special LANE features such that LANE components (such as the LANE Configuration Server, the LANE client, the LANE server, and the BUS) become aware of the Fast Simple Server Redundancy Protocol (FSSRP), use the **lane fssrp** command in interface configuration mode. To disable the LANE FSSRP configuration, use the **no** form of this command.

lane fssrp

no lane fssrp

Syntax Description

This command contains no arguments or keywords.

Defaults

FSSRP is not enabled by default.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(4c)W5(10a)	This command was introduced.

Usage Guidelines

You must execute this command on all ATM interfaces to enable FSSRP capability for all LANE components on that interface and hence all its subinterfaces.

Examples

The following example shows how to enable FSSRP on an ATM interface:

```
Router(config-if)# lane fssrp
```

Related Commands

Command	Description
lane client	Activates a LANE client on the specified subinterface.
lane server	Activates a LANE server on the specified subinterface.
show lane client	Generates additional FSSRP information about a LANE client.
show lane config	Displays global LANE information for the configuration server configured on an interface.

lane global-lecs-address

To specify a list of LAN Emulation Configuration Server (LECS) addresses to use when the addresses cannot be obtained from the Interim Local Management Interface (ILMI), use the **lane global-lecs-address** command in interface configuration mode. To remove a LECS address from the list, use the **no** form of this command.

lane global-lecs-address *address*

no lane global-lecs-address *address*

Syntax Description

address	Address of the LECS. You cannot use the well-known LECS address.

Defaults

No addresses are configured. The router obtains LECS addresses from the ILMI.

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Use this command when your ATM switches do not support the ILMI list of LECS addresses and you want to configure Simple Server Redundancy. This command will simulate the list of LECS addresses, as if they had been obtained from the ILMI. Use this command with a different address for each LECS. The order they are used determines their priority. You should enter the addresses in the same order as you would on the ATM switch.

Note You must configure the same list of addresses on each interface that contains a LAN emulation (LANE) entity.

If your switches do support ILMI, this command forces the router to use the addresses specified and will not use the ILMI to obtain the LECS addresses.

Because the well-known LECS address is always used as a last resort LECS address, you cannot use the address in this command.

lane le-arp

To add a static entry to the LAN Emulation Address Resolution Protocol (LE ARP) table of the LANE client configured on the specified subinterface, use the **lane le-arp** command in interface configuration mode. To remove a static entry from the LE ARP table of the LANE client on the specified subinterface, use the **no** form of this command.

lane le-arp {*mac-address* | **route-desc segment** *segment-number* **bridge** *bridge-number*} *atm-address*

no lane le-arp {*mac-address* | **route-desc segment** *segment-number* **bridge** *bridge-number*} *atm-address*

Syntax Description

mac-address	MAC address to bind to the specified ATM address.
route-desc segment *segment-number*	LANE segment number. The segment number ranges from 1 to 4095.
bridge *bridge-number*	Bridge number that is contained in the route descriptor. The bridge number ranges from 1 to 15.
atm-address	ATM address.

Defaults

No static address bindings are provided.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

This command adds or removes a static entry binding a MAC address or segment number and bridge number to an ATM address. It does not add or remove dynamic entries. Removing the static entry for a specified ATM address from a LE ARP table does not release data direct VCCs established to that ATM address. However, clearing a static entry clears any fast-cache entries that were created from the MAC address-to-ATM address binding.

Static LE ARP entries are neither aged nor removed automatically.

To remove dynamic entries from the LE ARP table of the LANE client on the specified subinterface, use the **clear lane le-arp** command.

Examples

The following example shows how to add a static entry to the LE ARP table:

```
Router(config-if)# lane le-arp 0800.aa00.0101 47.000014155551212f.00.00.0800.200C.1001.01
```

The following example shows how to add a static entry to the LE ARP table binding segment number 1, bridge number 1 to the ATM address:

```
Router(config-if)# lane le-arp route-desc segment 1 bridge 1
39.020304050607080910111213.00000CA05B41.01
```

Related Commands

Command	Description
clear lane le-arp	Forces a LANE server to drop a client and allow the LANE configuration server to assign the client to another ELAN.

lane server-atm-address

To specify an ATM address—and thus override the automatic ATM address assignment—for the LAN emulation (LANE) server on the specified subinterface, use the **lane server-atm-address** command in interface configuration mode. To remove the ATM address previously specified for the LANE server on the specified subinterface and thus revert to the automatic address assignment, use the **no** form of this command.

lane server-atm-address *atm-address-template*

no lane server-atm-address [*atm-address-template*]

Syntax Description

atm-address-template	ATM address or a template in which wildcard characters are replaced by any nibble or group of nibbles of the prefix bytes, the end-system identifier (ESI) bytes, or the selector byte of the automatically assigned ATM address.

Defaults

For the LANE server, the default is automatic address assignment; the LANE client finds the LANE server by consulting the configuration server.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

This command also instructs the LANE client configured on this subinterface to reach the LANE server by using the specified ATM address instead of the ATM address provided by the configuration server.

When used on a selected subinterface, but with a different ATM address than was used previously, this command replaces the ATM address of the LANE server.

ATM Addresses

A LANE ATM address has the same syntax as an network service access point (NSAP) (but it is not a network-level address). It consists of the following:

- A 13-byte prefix that includes the following fields defined by the ATM Forum:
  - AFI (Authority and Format Identifier) field (1 byte)
  - DCC (Data Country Code) or ICD (International Code Designator) field (2 bytes)
  - DFI field (Domain Specific Part Format Identifier) (1 byte)
  - Administrative Authority field (3 bytes)
  - Reserved field (2 bytes)
  - Routing Domain field (2 bytes)

  - Area field (2 bytes)
- A 6-byte ESI
- A 1-byte selector field

Address Templates

LANE ATM address templates can use two types of wildcards: an asterisk (*) to match any single character (nibble), and an ellipsis (...) to match any number of leading, middle, or trailing characters. The values of the characters replaced by wildcards come from the automatically assigned ATM address.

In LANE, a *prefix template* explicitly matches the prefix, but uses wildcards for the ESI and selector fields. An *ESI template* explicitly matches the ESI field, but uses wildcards for the prefix and selector.

In the Cisco implementation of LANE, the prefix corresponds to the switch, the ESI corresponds to the ATM interface, and the selector field corresponds to the specific subinterface of the interface.

For a discussion of the Cisco method of automatically assigning ATM addresses, refer to the "Configuring LAN Emulation" chapter of the *Cisco IOS Switching Services Configuration Guide*.

Examples

The following example shows how to used an ESI template to specify the part of the ATM address corresponding to the interface; the remaining parts of the ATM address come from automatic assignment:

```
Router(config-if)# lane server-atm-address ...0800.200C.1001.**
```

The following example shows how to use a prefix template to specify the part of the ATM address corresponding to the switch; the remaining part of the ATM address come from automatic assignment:

```
Router(config-if)# lane server-atm-address 45.000014155551212f.00.00...
```

Related Commands

Command	Description
lane server-bus	Enables a LANE server and a BUS on the specified subinterface with the ELAN ID.

lane server-bus

To enable a LAN emulation (LANE) server and a broadcast and unknown server (BUS) on the specified subinterface with the emulated LAN (ELAN) ID, use the **lane server-bus** command in interface configuration mode. To disable a LANE server and BUS on the specified subinterface, use the **no** form of this command.

lane server-bus {**ethernet**} *elan-name* [**elan-id** *id*]

no lane server-bus {**ethernet**} *elan-name* [**elan-id** *id*]

Syntax Description

ethernet	Identifies the ELAN attached to this subinterface as an Ethernet ELAN.
elan-name	Name of the ELAN. The maximum length of the name is 32 characters.
elan-id	(Optional) Identifies the ELAN.
id	(Optional) Specifies the ELAN ID of the LAN emulation client (LEC).

Defaults

No LAN type or ELAN name is provided.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.
12.0	This command was modified to support the **elan-id** keyword.
12.3(2)T	The **tokenring** keyword was removed from this command.

Usage Guidelines

The LANE server and the BUS are located on the same router.

If a **lane server-bus** command has already been used on the subinterface for a different ELAN, the server initiates termination procedures with all clients and comes up as the server for the new ELAN.

To participate in MPOA, a LEC must have an ELAN ID. This command enables the LEC to get the ELAN ID from the LES when the LEC bypasses the LECS phase.

Caution If an ELAN ID is supplied, make sure that it corresponds to the same ELAN ID value specified in the LECS for the same ELAN.

The LEC can also obtain the ELAN ID from the LECS by using the **name elan-id** command.

Examples

The following example shows how to enable a LANE server and BUS for an Ethernet ELAN named MYELAN:

```
Router(config-if)# lane server-bus ethernet myelan
```

Related Commands

Command	Description
lane server-atm-address	Specifies an ATM address and thus overrides the automatic ATM address assignment for the LANE server on a specified subinterface.
name elan-id	Configures the ELAN ID of an ELAN in the LECS database to participate in MPOA.

logging event atm pvc state

To enable notification of ATM permanent virtual circuit (PVC) state changes, use the **logging event atm pvc state** command in interface configuration mode. To disable notification, use the **no** form of this command.

logging event atm pvc state

no logging event atm pvc state

Syntax Description

This command has no arguments or keywords.

Command Default

None

Command Modes

Interface configuration

Command History

Release	Modification
12.3	This command was introduced.

Usage Guidelines

For monitoring purposes, this command can be used to log the state changes for all PVCs associated with an ATM interface.

Examples

The following example shows how to enable notification of ATM PVC state changes:

```
Router(config-if)# logging event atm pvc state
```

Related Commands

Command	Description
debug atm state	Displays messages about ATM PVC state changes.

loopback (ATM)

To configure the ATM interface into loopback mode, use the **loopback** interface configuration command. To remove the loopback, use the **no** form of this command.

loopback [**cell** | **line** | **payload**]

no loopback [**cell** | **line** | **payload**]

Syntax Description

cell	(Optional) Places the interface into external loopback at cell level.
line	(Optional) Places the interface into external loopback at the line.
payload	(Optional) Places the interface into external loopback at the payload level.

Defaults

line

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.
11.1	The following keywords were removed: • **diagnostic** • **test**

Usage Guidelines

This command is useful for testing because it loops all packets from the ATM interface back to the interface as well as directing the packets to the network.

Use the **loopback line** command to check that the PA-A3 port adapter is working by looping the receive data back to the transmit data.

Examples

The following example loops all packets back to the ATM interface:

```
interface atm 4/0
 loopback
```

Related Commands

Command	Description
ces dsx1 loopback	Enables a loopback for the CBR interface.

loopback

To loop packets back to the interface for testing, use the **loopback** interface configuration command with or without an optional keyword. To remove the loopback, use the **no** form of this command.

Cisco 2600 and 3600 Series

loopback [**line** | **local** | **payload** | **remote**]

no loopback [**line** | **local** | **payload** | **remote**]

Cisco 7100, 7200, and 7500 Series

For T1 lines:

loopback {**diagnostic** | **local** {**payload** | **line**} | **remote** {**iboc** | **esf** {**payload** | **line**}}}

For E1 lines:

loopback {**diagnostic** | **local** {**payload** | **line**}}

no loopback

Syntax Description

line	Places the interface into external loopback mode at the line.
local	Places the interface into local loopback mode.
payload	Places the interface into external loopback mode at the payload level.
remote	Keeps the local end of the connection in remote loopback mode.
diagnostic	Loops the outgoing transmit signal back to the receive signal.
iboc	Sends an in-band code to the far-end receiver to cause it to go into line loopback.
esf	Specifies the FDL loopbacks. FDL should be configured on the link.

Defaults

The **line** keyword is the default.
Loopback is disabled by default.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.
11.3 MA	This command was modified for the Cisco MC3810.
12.0(5)XK	Support for the Cisco 2600 and 3600 series routers was added.
12.0(5)T	Support for the Cisco 2600 and 3600 series routers was integrated into Cisco IOS Release 12.0(5)T.
12.0(5)XE	Support for the Cisco 720 0 and 7500 series routers was added.

Release	Modification
12.0(7)XE1	Support for the Cisco 7100 series routers was added.
12.1(5)T	Support for Cisco 7100, 7200, and 7500 series routers was integrated into Cisco IOS Release 12.1(5)T.

Usage Guidelines

You can use a loopback test on lines to detect and distinguish equipment malfunctions caused either by line and channel service unit/digital service unit (CSU/DSU) or by the interface. If correct data transmission is not possible when an interface is in loopback mode, the interface is the source of the problem.

The local loopback does not generate any packets automatically. Instead, the **ping** command is used.

Examples

The following example sets up local loopback diagnostics:

```
interface atm 1/0
 loopback local
```

mac-address (ATM)

To configure the MAC address on ATM permanent virtual circuits (PVCs) in a broadband access (BBA) group for using a different MAC address for PPP over Ethernet over ATM (PPPoEoA), use the **mac-address** command in BBA group configuration mode. To remove a MAC address, use the **no** form of this command.

mac-address {**autoselect** | *mac-address*}

no mac-address {**autoselect** | *mac-address*}

Syntax Description

autoselect	Automatically selects the MAC address based on the ATM interface.
mac-address	MAC address (MAC value) to be used on ATM interfaces, entered as a series of three hexadecimal numbers presented in dotted notation. Example: 0100.CCCC.CCCD.

Defaults

No MAC address change. Any change in the usage of MAC addresses will not happen unless this command is explicitly configured.

Command Modes

BBA group configuration mode

Command History

Release	Modification
12.3(11)T	This command was introduced.

Usage Guidelines

Except for using a different MAC address, this command does not change the way PPPoE works.

Use the **mac-address** command to configure the MAC address on ATM PVCs in a BBA group so there will be a different MAC address for PPPoEoA.

If a PPP over Ethernet (PPPoE) profile is not specified by using the group option, PPPoE sessions will be established using values from the global PPPoE profile. PPPoE profiles must be configured using the **bba-group pppoe** command.

Examples

The following example configures the MAC address on an ATM PVC in a BBA group using values from the global PPPoE profile by specifying the MAC address:

```
Router(config)# bba-group pppoe global
Router(config-bba-group)# virtual-template 1
Router(config-bba-group)# mac-address 1.1.3
```

The following example configures the MAC address automatically on an ATM PVC in a BBA group using group profile by using the **autoselect** option:

```
Router(config)# bba-group pppoe vpn1
Router(config-bba-group)# virtual-template 1
Router(config-bba-group)# mac-address autoselect
```

Related Commands

Command	Description
bba-group pppoe	Creates a PPPoE profile on the BBA group.
protocol pppoe	Establishes PPPoE sessions on PVCs.

map-class atm

This command is no longer supported.

mid

To set the range of message identifier (MID) values on a permanent virtual circuit (PVC), use the **mid** interface-ATM-VC configuration command. To remove MID value range settings, use the **no** form of this command.

mid *midlow midhigh*

no mid *midlow midhigh*

Syntax Description

midlow	Starting MID number for this PVC. This can be set between 0 and 1023.
midhigh	Ending MID number for this PVC. This can be set between 0 and 1023.

Defaults

0

Command Modes

Interface-ATM-VC configuration

Command History

Release	Modification
11.3(2)T	This command was introduced.

Usage Guidelines

This command is only available when SMDS encapsulation is configured on a PVC.

Use this command to assign different ranges of message identifiers to different PVCs.

Examples

In the following example, the **atm mid-per-vc** command limits the maximum number of message identifiers to 32 for each VC on the ATM interface. Using the **mid** command, the selected range of numbers that are available for the message identifiers on PVC 1/40 is 0 to 31. For PVC 2/50, the range is 32 to 63.

```
interface atm 2/0
 atm mid-per-vc 32
 pvc 1/40 smds
 mid 0 31
 pvc 2/50 smds
 mid 32 63
```

mpoa client config name

To define a Multiprotocol over ATM (MPOA) client (MPC) with a specified name, use the **mpoa client config name** command in global configuration mode. To delete the MPC, use the **no** form of this command.

mpoa client config name *mpc-name*

no mpoa client config name *mpc-name*

Syntax Description

mpc-name	Specifies the name of an MPC.

Defaults

No MPC is defined.

Command Modes

Global configuration

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Usage Guidelines

When you configure or create an MPC, you automatically enter the MPC configuration mode. From here, you can enter subcommands to define or change MPC variables specific only to this MPC. Note that the MPC is not functional until it is attached to a hardware interface.

Examples

The following example shows how to create or modify the MPC named ip_mpc:

```
Router(config)# mpoa client config name ip_mpc
```

Related Commands

Command	Description
atm-address	Overrides the control ATM address of an MPC or MPS.
shortcut-frame-count	Specifies the maximum number of times a packet can be routed to the default router within shortcut-frame time before an MPOA resolution request is sent.
shortcut-frame-time	Sets the shortcut-setup frame time (in seconds) for the MPC.

mpoa client name

To attach a Multiprotocol over ATM (MPOA) client (MPC) to a major ATM interface, use the **mpoa client name** command in interface configuration mode. To break the attachment, use the **no** form of this command.

mpoa client name *mpc-name*

no mpoa client name *mpc-name*

Syntax Description

mpc-name	Specifies the name of an MPC.

Defaults

No MPC is attached to an ATM interface.

Command Modes

Interface configuration

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Usage Guidelines

The **mpoa client name** command provides an interface to the MPC through which the MPC can set up and receive calls.

When you enter this command on a major interface that is up and operational, the named MPC becomes operational. Once the MPC is fully operational, it can register its ATM address.

Examples

The following example shows how to attache the MPC named ip_mpc to an interface:

```
Router(config)# interface atm 1/0
Router(config-if)# mpoa client name ip_mpc
```

mpoa server config name

To define a Multiprotocol over ATM (MPOA) server (MPS) with the specified name, use the **mpoa server config name** command in global configuration mode. To delete an MPS, use the **no** form of this command.

mpoa server config name *mps-name*

no mpoa server config name *mps-name*

Syntax Description

mps-name	Name of the MPOA server.

Defaults

No MPS is defined.

Command Modes

Global configuration

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Usage Guidelines

This command defines an MPS with the specified name. The MPS does not actually start functioning until it is attached to a specific hardware interface. Once that attachment is complete, the MPS starts functioning. When you configure or create an MPS, you automatically enter the MPS configuration mode.

You can define the MPS variables specific to an MPS only after that MPS has been defined with a specified name. After this command is entered, further commands can be used to change MPS variables that are specific only to this MPS.

Examples

The following example shows how to define the MPS named MYMPS:

```
Router(config)# mpoa server config name MYMPS
```

mpoa server name trigger ip-address

To originate a Multiprotocol over ATM (MPOA) trigger for the specified IP address to the specified MPOA client from the specified Multiprotocol over ATM server (MPS), use the **mpoa server name trigger ip-address** command in interface configuration mode.

mpoa server name *mps-name* **trigger ip-address** *ip-address* [**mpc-address** *mpc-address*]

Syntax Description

mps-name	Specifies the name of the MPOA server.
ip-address	Specifies the IP address.
mpc-address *mpc-address*	(Optional) Specifies the MPOA client (MPC) address to which the trigger should be sent. If the address is not specified, a trigger will be sent to all clients.

Command Modes

Interface configuration

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Usage Guidelines

This command sends an MPOA trigger for the specified IP address to the specified MPOA client from the specified MPOA server. If an MPOA client is not specified, it is triggered to all MPOA clients.

Examples

The following example shows how to send an MPOA trigger for the specified IP address 128.9.0.7 to all known MPOA clients from the MPOA server named MYMPS:

```
Router(config)# interface atm 1/0
Router(config-if)# mpoa server name MYMPS trigger ip-address 128.9.0.7
```

mpoa server name

To attach a Multiprotocol over ATM (MPOA) server (MPS) to a major ATM interface, use the **mpoa server name** command in interface configuration mode. To break the attachment, use the **no** form of this command.

mpoa server name *mps-name*

no mpoa server name *mps-name*

Syntax Description

mps-name	Name of the MPOA server.

Defaults

No MPS is attached to an ATM interface.

Command Modes

Interface configuration

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Usage Guidelines

This command attaches an MPS to a specific (major) interface. At this point, the MPS can obtain its autogenerated ATM address and an interface through which it can communicate to the neighboring MPOA devices. Only when an MPS is both defined globally and attached to an interface is it considered to be operational. Although multiple different servers may share the same hardware interface, an MPS can be attached to only a single interface at any one time. The specified MPS must already be defined when this command is entered.

Examples

The following example attaches the MPS named MYMPS to an ATM interface:

```
Router(config)# interface atm 1/0
Router(config-if)# mpoa server name MYMPS
```

multiqueue

To enable two queues to prioritize multiple classes of packet streams over the same PVC, use the **multiqueue** command in PVC- or VC-class configuration mode To return to a single-queue approach, use the **no** form of this command.

multiqueue

no multiqueue

Syntax Description

This command has no arguments or keywords.

Command Default

Only a single queue per PVC is enabled.

Command Modes

PVC-class configuration
VC-class configuration

Command History

Release	Modification
12.4(2)XA	This command was introduced.
12.4(6)T	This command was integrated into Cisco IOS Release 12.4(6)T.

Usage Guidelines

This command enables a priority queue and a regular (nonpriority) queue for traffic streams. When the **multiqueue** command is enabled and multiple classes of packet streams exist over the same PVC, packets coming from the streams that have priority values configured in a policy map are sent to the high-priority queue. Packets from all other streams are sent to the low-priority queue.

This command applies only to DSL ATM interfaces. Multiqueueing is intended for configuring DSL lines and allows configuring one data flow in a priority queue. If you have configured more than one flow in a priority queue, the latency for delay-sensitive traffic flow might not be guaranteed.

Multiqueueing does not work well with applications such as Multilink PPP (MLP) with interleave and Crypto. This is because MLP uses the same sequence numbering scheme for interleaved packets as multiqueueing. For example, if there are a voice packet and two data packets interleaved, the MLP sequence numbers for these packets could be 1 for the first data packet, 2 for the voice packet, and 3 for a second data packet. With multiqueueing, the voice packet with MLP sequence number 2 goes out before the data packet with MLP sequence number 1. This causes out-of-order sequencing of packets as far as MLP is concerned and causes unexpected behavior. The same problems apply to the Crypto application.

Multiqueueing is disabled by default, so that when MLP and the Crypto applications are used with DSL, the network is disrupted by upgrading to an image with multiqueueing support.

Examples

The following example shows how to enter the command from PVC configuration mode:

```
Router(config-if-atm-vc)# multiqueue
```

The following example shows how to enter the command from VC-class configuration mode:

```
Router(config)# vc-class atm x
Router(config-vc-class)# multiqueue
```

The following example shows how to return the queues to the default state:

```
Router(config-if-atm-vc)# no multiqueue
```

Related Commands

Command	Description
tx-ring-limit	Limits the number of packets that can be used on a transmission ring on the DSL WIC or interface.

name elan-id

To configure the emulated LAN (ELAN) ID of an ELAN in the LAN Emulation Configuration Server (LECS) database to participate in Multiprotocol over ATM (MPOA), use the **name elan-id** command in LANE database configuration mode. To disable the ELAN ID of an ELAN in the LECS database to participate in MPOA, use the **no** form of this command.

name *name* **elan-id** *id*

no name *name* **elan-id** *id*

Syntax Description

name	Specifies the name of the ELAN.
id	Specifies the identification number of the ELAN.

Defaults

No ELAN ID is configured.

Command Modes

LANE database configuration

Command History

Release	Modification
12.0	This command was introduced.

Usage Guidelines

To participate in MPOA, a LAN Emulation Client (LEC) must have an ELAN ID. The LEC obtains the ELAN ID from the LECS. In case the LEC bypasses the LECS phase, the LEC can get the ELAN ID from the LES when the **name elan-id** command is used.

Examples

The following example shows how to set the ELAN ID to 10 for an ELAN named MYELAN:

```
Router(lane-config-dat)# name MYELAN elan-id 10
```

Related Commands

Command	Description
lane server-bus	Enables a LANE server and a broadcast and unknown server on the specified subinterface with the ELAN ID.

name local-seg-id

To specify or replace the ring number of the emulated LAN (ELAN) in the configuration server's configuration database, use the **name local-seg-id** command in database configuration mode. To remove the ring number from the database, use the **no** form of this command.

name *elan-name* **local-seg-id** *segment-number*

no name *elan-name* **local-seg-id** *segment-number*

Syntax Description

elan-name	Name of the ELAN. The maximum length of the name is 32 characters.
segment-number	Segment number to be assigned to the ELAN. The number ranges from 1 to 4095.

Defaults

No ELAN name or segment number is provided.

Command Modes

LANE database configuration

Command History

Release	Modification
11.3	This command was introduced.

Usage Guidelines

This command is ordinarily used for Token Ring LANE.

The same LANE ring number cannot be assigned to more than one ELAN.

The **no** form of this command deletes the relationships.

Examples

The following example shows how to specify a ring number of 1024 for the ELAN named red:

```
Router(lane-config-dat)# name red local-seg-id 1024
```

Related Commands

Command	Description
default-name	Provides an ELAN name in the database of the configuration server for those client MAC addresses and client ATM addresses that do not have explicit ELAN name bindings.
lane database	Creates a named configuration database that can be associated with a configuration server.
mac-address	Sets the MAC-layer address of the Cisco Token Ring.

name preempt

To set the emulated LAN (ELAN) preempt, use the **name preempt** command in LANE database configuration mode. To disable preemption, use the **no** form of this command.

name *elan-name* **preempt**

no name *elan-name* **preempt**

Syntax Description

elan-name	Specifies the name of the ELAN.

Defaults

Preemption is disabled by default.

Command Modes

LANE database configuration

Command History

Release	Modification
11.3	This command was introduced.

Usage Guidelines

Prior to Cisco IOS Release 11.3, when the primary LAN Emulation Server (LES) failed, the Cisco Simple Server Redundancy Protocol (SSRP) switched over to a secondary LES. But when a LES that is ranked higher in the list came back up, the SSRP protocol switched the active LES to the new LES, which had a higher priority. This forced the network to flap multiple times. We have prevented the network flapping by staying with the currently active master LES regardless of the priority. If a higher priority LES comes back online, SSRP will not switch to that LES.

LES preemption is off by default. The first LES that comes on becomes the master. Users can revert to the old behavior (of switching to the higher-priority LES all the time) by specifying the **name** *elan-name* **preempt** command in the LECS database.

Examples

The following example shows how to set the ELAN preempt for the ELAN named MYELAN:

```
Router(lane-config-dat)# name MYELAN preempt
```

name server-atm-address

To specify or replace the ATM address of the LAN Emulation (LANE) server for the emulated LAN (ELAN) in the configuration server's configuration database, use the **name server-atm-address** command in database configuration mode. To remove it from the database, use the **no** form of this command.

name *elan-name* **server-atm-address** *atm-address* [**restricted | un-restricted**] [**index** *number*]

no name *elan-name* **server-atm-address** *atm-address* [**restricted | un-restricted**] [**index** *number*]

Syntax Description

elan-name	Name of the ELAN. Maximum length is 32 characters.
atm-address	LANE server's ATM address.
**restricted	un-restricted**	(Optional) Membership in the named ELAN is restricted to the LANE clients explicitly defined to the ELAN in the configuration server's database.
index *number*	(Optional) Priority number. When specifying multiple LANE servers for fault tolerance, you can specify a priority for each server. 0 is the highest priority.

Defaults

No emulated LAN name or server ATM address is provided.

Command Modes

Database configuration

Command History

Release	Modification
11.0	This command was introduced.
11.2	The following keywords were added: • **un-restricted** • **index**

Usage Guidelines

ELAN names must be unique within one named LANE configuration database.

Specifying an existing ELAN name with a new LANE server ATM address adds the LANE server ATM address for that ELAN for redundant server operation or simple LANE service replication. This command can be used multiple times.

The **no** form of this command deletes the relationships.

Examples

The following example shows how to configure the example3 database with two restricted and one unrestricted ELANs. The clients that can be assigned to the eng and mkt ELANs are specified using the **client-atm-address** commands. All other clients are assigned to the man ELAN.

```
Router(config)# lane database example3
```

```
Router(lane-config-dat)# name eng server-atm-address
39.000001415555121101020304.0800.200c.1001.02 restricted
Router(lane-config-dat)# name man server-atm-address
39.000001415555121101020304.0800.200c.1001.01
Router(lane-config-dat)# name mkt server-atm-address
39.000001415555121101020304.0800.200c.4001.01 restricted
Router(lane-config-dat)# client-atm-address 39.000001415555121101020304.0800.200c.1000.02
name eng
Router(lane-config-dat)# client-atm-address 39.000001415555121101020304.0800.200c.2000.02
name eng
Router(lane-config-dat)# client-atm-address 39.000001415555121101020304.0800.200c.3000.02
name mkt
Router(lane-config-dat)# client-atm-address 39.000001415555121101020304.0800.200c.4000.01
name mkt
Router(lane-config-dat)# default-name man
Router(lane-config-dat)# exit
```

Related Commands

Command	Description
client-atm-address name	Adds a LANE client address entry to the configuration database of the configuration server.
default-name	Provides an ELAN name in the database of the configuration server for those client MAC addresses and client ATM addresses that do not have explicit ELAN name bindings.
lane database	Creates a named configuration database that can be associated with a configuration server.
mac-address	Sets the MAC-layer address of the Cisco Token Ring.

network-clock-select (ATM)

To establish the sources and priorities of the requisite clocking signals for an ATM-CES port adapter, use the **network-clock-select** command in global configuration mode. To remove the clock source, use the **no** form of this command.

network-clock-select *priority* {**cbr** | **atm**} *slot*/*port*

no network-clock-select *priority* {**cbr** | **atm**} *slot*/*port*

Syntax Description

priority	Priority of the clock source. Values are 1 (high priority) to 4 (low priority).
cbr	Specifies a CBR interface to supply the clock source.
atm	Specifies an ATM interface to supply the clock source.
slot/	Backplane slot number.
port	Interface port number.

Defaults

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

To support synchronous or synchronous residual time stamp (SRTS) clocking modes on the CBR interface, you must specify a primary reference source to synchronize the flow of CBR data from its source to its destination.

You can specify up to four clock priorities. The highest priority active interface in the router supplies primary reference source to all other interfaces that require network clock synchronization services. The fifth priority is the local oscillator on the ATM-CES port adapter.

Use the **show network-clocks** command to display currently configured clock priorities on the router.

Examples

The following example defines two clock priorities on the router:

```
network-clock-select 1 cbr 2/0
network-clock-select 2 atm 2/0
```

Related Commands

Command	Description
ces aal1 clock	Configures the AAL1 timing recovery clock for the CBR interface.
ces dsx1 clock source	Configures a transmit clock source for the CBR interface.
show network-clocks	Displays which ports are designated as network clock sources.

network-id

To specify the network ID of a Multiprotocol over ATM (MPOA) server (MPS), use the **network-id** command in MPS configuration mode. To revert to the default value (default value is 1), use the **no** form of this command.

network-id *id*

no network-*id*

Syntax Description

id	Specifies the network ID of the MPOA server.

Defaults

The default value for the network ID is 1.

Command Modes

MPS configuration

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Usage Guidelines

Specifies the network ID of this MPS. This value is used in a very similar way the NHRP network ID is used. It is for partitioning nonbroadcast multiaccess (NBMA) clouds artificially by administration.

Examples

The following example shows how to set the network ID to 5:

```
Router(mpoa-server-config)# network-id 5
```

oam ais-rdi

To configure an ATM permanent virtual circuit (PVC) to be brought down after a specified number of Operation, Administration, and Maintenance (OAM) alarm indication signal/remote defect indication (AIS/RDI) cells have been received on the PVC or brought up if no OAM AIS/RDI cells have been received in a specified interval, use the **oam ais-rdi** command in ATM VC configuration or VC class configuration mode. To return OAM AIS/RDI behavior to the default, use the **no** form of this command.

oam ais-rdi [*down-count* [*up-count*]]

no oam ais-rdi [*down-count* [*up-count*]]

Syntax Description

down-count	(Optional) Number of consecutive OAM AIS/RDI cells received before the PVC is brought down. The range is from 1 to 60. The default is 1.
up-count	(Optional) Number of seconds after which a PVC will be brought up if no OAM AIS/RDI cells are received. The range is from 3 to 60. The default is 3.

Defaults

Down count: 1
Up count: 3

Command Modes

ATM VC configuration
VC class configuration

Command History

Release	Modification
12.1(2)T	This command was introduced.

Usage Guidelines

The default values for the OAM AIS/RDI down count and up count are used in the following situations:

- If the **oam ais-rdi** command has not been entered
- If the **oam ais-rdi** command is entered without the *up-count* or *down-count* argument
- If the **no oam ais-rdi** command is entered

If the **oam ais-rdi** command is entered without the *up-count* or *down-count* argument, the command will not appear in the **show running-config** command output.

Examples

In the following example, PVC 0/400 will be brought down after 25 consecutive OAM AIS/RDI cells have been received on the PVC. The PVC will be brought up when no OAM AIS/RDI cells have been received for 5 seconds.

```
interface ATM2/0/0
 ip address 172.2.222.20 255.255.255.0
 no ip route-cache cef
 no ip route-cache distributed
 no atm ilmi-keepalive
 pvc 0/400
  protocol ip 172.2.223.21
  oam-pvc manage 30
  oam ais-rdi 25 5
```

oam retry cc

To set the frequency at which ATM Operation, Administration, and Maintenance (OAM) F5 continuity check (CC) activation and deactivation requests are sent to a device at the other end of a segment or permanent virtual circuit (PVC), use the **oam retry cc** command in ATM virtual circuit configuration mode. To remove the retry settings, use the **no** form of this command.

oam retry cc {**end** | **segment**} [*activation-count* [*deactivation-count* [*retry-frequency*]]]

no oam retry cc {**end** | **segment**} [*activation-count* [*deactivation-count* [*retry-frequency*]]]

Syntax Description

end	End-to-end continuity check.
segment	Segment continuity check.
activation-count	(Optional) Maximum number of times the activation request will be sent before the receipt of an acknowledgment. The range is from 3 to 600. The default is 3.
deactivation-count	(Optional) Maximum number of times the deactivation request will be sent before the receipt of an acknowledgment. The range is from 3 to 600. The default is 3.
retry-frequency	(Optional) Interval between retries, in seconds. The default is 30 seconds.

Defaults

Activation count: 3
Deactivation count: 3
Retry frequency: 30 seconds

Command Modes

ATM virtual circuit configuration

Command History

Release	Modification
12.2(13)T	This command was introduced.

Examples

The following example shows how to configure ATM OAM F5 CC support over the segment and configure the router to function as the source. The frequency at which CC activation and deactivation requests will be sent over the segment is also configured.

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

Related Commands

Command	Description
oam-pvc manage cc deny	Configures ATM OAM F5 CC management.
oam-pvc manage cc deny	Disables ATM OAM F5 CC support and configures the PVC to deny CC activation requests.

oam retry

To configure parameters related to Operation, Administration, and Maintenance (OAM) management for an ATM permanent virtual circuit (PVC), switched virtual circuit (SVC), VC class, or VC bundle, or label-controlled ATM (LC-ATM) VC, use the **oam retry** command in the appropriate command mode. To remove OAM management parameters, use the **no** form of this command.

oam retry *up-count down-count retry-frequency*

no oam retry

Syntax Description

up-count	Number of consecutive end-to-end F5 OAM loopback cell responses that must be received in order to change a connection state to up. This argument does not apply to SVCs.
down-count	Number of consecutive end-to-end F5 OAM loopback cell responses that are not received in order to change the state to down or tear down an SVC connection.
retry-frequency	The frequency (in seconds) at which end-to-end F5 OAM loopback cells are transmitted when a change in the 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) argument is specified using the **oam-pvc** command, loopback cells are sent at the *retry-frequency* to verify whether the PVC is down.

Defaults

ATM PVCs and SVCs

up-count: 3
down-count: 5
retry-frequency: 1 second

LC-ATM VCs

up-count: 2
down-count: 2
retry-frequency: 2 seconds

Command Modes

Interface-ATM-VC configuration (for an ATM PVC or SVC)
VC-class configuration (for a VC class)
Bundle configuration mode (for a VC bundle)
PVC range configuration (for an ATM PVC range)
PVC-in-range configuration (for an individual PVC within a PVC range)
Control-VC configuration (for an LC-ATM VC)

Command History

Release	Modification
11.3 T	This command was introduced.
12.0(3)T	This command was modified to allow configuration parameters related to OAM management for ATM VC bundles.

Release	Modification
12.1(5)T	This command was implemented in PVC range and PVC-in-range configuration modes.
12.3(2)T	This command was implemented in control-VC configuration mode.

Usage Guidelines

The following guidelines apply to PVCs, SVCs, and VC classes. They do not apply to LC-ATM VCs.

- For ATM PVCs, SVCs, or VC bundles, if the **oam retry** command is not explicitly configured, the VC inherits the following default configuration (listed in order of precedence):
  - Configuration of the **oam retry** command in a VC class assigned to the PVC or SVC itself.
  - Configuration of the **oam retry** command in a VC class assigned to the PVC's or SVC's ATM subinterface.
  - Configuration of the **oam retry** command in a VC class assigned to the PVC's or SVC's ATM main interface.
  - Global default: *up-count* = 3, *down-count* = 5, *retry-frequency* = 1 second. This set of defaults assumes that OAM management is enabled using the **oam-pvc** or **oam-svc** command. The *up-count* and *retry-frequency* arguments do not apply to SVCs.
- To use this command in bundle configuration mode, enter the bundle command to create the bundle or to specify an existing bundle before you enter this command.
- If you use the **oam retry** command to configure a VC bundle, you configure all VC members of that bundle. VCs in a VC bundle are further subject to the following inheritance rules (listed in order of precedence):
  - VC configuration in bundle-vc mode
  - Bundle configuration in bundle mode (with the effect of assigned VC-class configuration)
  - Subinterface configuration in subinterface mode

Examples

The following example shows how to configure the OAM management parameters with an up count of 3, a down-count of 3, and the retry frequency set at 10 seconds:

```
Router(cfg-mpls-atm-cvc)# oam retry 3 3 10
```

Related Commands

Command	Description
broadcast	Configures broadcast packet duplication and transmission for an ATM VC class, PVC, SVC, or VC bundle.
class-int	Assigns a VC class to an ATM main interface or subinterface.
class-vc	Assigns a VC class to an ATM PVC, SVC, or VC bundle member.
encapsulation	Sets the encapsulation method used by the interface.
inarp	Configures the Inverse ARP time period for an ATM PVC, VC class, or VC bundle.
oam-bundle	Enables end-to-end F5 OAM loopback cell generation and OAM management for a virtual circuit class that can be applied to a virtual circuit bundle.

Command	Description
oam-pvc	Enables end-to-end F5 OAM loopback cell generation and OAM management for an ATM PVC or virtual circuit class.
oam-svc	Enables end-to-end F5 OAM loopback cell generation and OAM management for an ATM SVC or virtual circuit class.
protocol (ATM)	Configures a static map for an ATM PVC, SVC, VC class, or VC bundle. Enables Inverse ARP or Inverse ARP broadcasts on an ATM PVC by either configuring Inverse ARP directly on the PVC, on the VC bundle, or in a VC class (applies to IP and IPX protocols only).
ubr	Configures UBR QoS and specifies the output peak cell rate for an ATM PVC, SVC, VC class, or VC bundle member.
ubr+	Configures UBR QoS and specifies the output peak cell rate and output minimum guaranteed cell rate for an ATM PVC, SVC, VC class, or VC bundle member.
vbr-nrt	Configures the VBR-NRT QoS and specifies output peak cell rate, output sustainable cell rate, and output maximum burst cell size for an ATM PVC, SVC, VC class, or VC bundle member.

oam-pvc manage cc deny

To disable ATM Operation, Administration, and Maintenance (OAM) F5 continuity check (CC) support and configure a permanent virtual circuit (PVC) to deny CC activation requests, use the **oam-pvc manage cc deny** command in ATM virtual circuit configuration mode. To reenable OAM F5 CC support and allow CC activation requests, use the **no** form of this command.

oam-pvc manage cc {**end** | **segment**} **deny**

no oam-pvc manage cc {**end** | **segment**} **deny**

Syntax Description

end	End-to-end continuity checking.
segment	Segment continuity checking.

Defaults

If the peer device sends the activation message, F5 CC management will be enabled on the PVC.

Command Modes

ATM virtual circuit configuration

Command History

Release	Modification
12.2(13)T	This command was introduced.

Usage Guidelines

Use the **oam-pvc manage cc deny** command to configure a permanent virtual circuit (PVC) to respond to activation requests from a peer device with "activation denied" messages. The **oam-pvc manage cc deny** command prevents ATM OAM F5 CC management from being activated on the PVC.

Use the **no oam-pvc manage cc** command to send a deactivation request to the peer device. The **no oam-pvc manage cc** command will disable ATM OAM F5 CC management on the PVC until the PVC receives an activation request. When the PVC receives an activation request, ATM OAM F5 CC management will be reenabled.

Examples

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

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

Related Commands

Command	Description
oam-pvc manage cc deny	Configures ATM OAM F5 CC management.
oam retry cc	Sets the frequency at which ATM OAM F5 CC activation and deactivation requests are sent to the device at the other end of a segment or PVC.

oam-pvc manage cc

To configure ATM Operation, Administration, and Maintenance (OAM) F5 continuity check (CC) management, use the **oam-pvc manage cc** command in ATM virtual circuit configuration mode. To disable OAM F5 continuity checking, use the **no** form of this command.

oam-pvc manage cc {**end** | **segment**} [**direction** {**both** | **sink** | **source**}] [**keep-vc-up** [**end aisrdi failure** | **seg aisrdi failure**]]

no oam-pvc manage cc {**end** | **segment**} [**deactivate-down-vc**] [**direction** {**both** | **sink** | **source**}] [**keep-vc-up** [**end aisrdi failure** | **seg aisrdi failure**]]

Syntax Description

end	End-to-end continuity checking. Monitoring occurs on the entire VC between two ATM end stations.
segment	Segment continuity checking. Monitoring occurs on a VC segment between a router and a first-hop ATM switch.
direction	(Optional) Direction of CC cell transmission.
both	(Optional) Specifies that CC cells transmit toward and away from the activator.
sink	(Optional) Specifies that CC cells transmit toward the activator. This is the default direction.
source	(Optional) Specifies that CC cells transmit away from the activator.
keep-vc-up	(Optional) Specifies that VC will be kept in the UP state when CC cells detect connectivity failure.
end aisrdi failure	(Optional) Specifies that if end alarm indication signals/remote defect indications (AIS/RDI) cells are received, the VC will not be brought down because of segment CC failure.
seg aisrdi failure	(Optional) Specifies that if segment AIS/RDI cells are received, the VC will not be brought down because of end CC failure or loopback failure.
deactivate-down-vc	(Optional) Specifies that an OAM F5 CC deactivation message will be sent when the VC is operationally down and in the CC active state. This keyword is available only when the **no** form of this command is used.

Defaults

The default direction is **sink**.

Command Modes

ATM virtual circuit configuration

Command History

Release	Modification
12.2(13)T	This command was introduced.

Usage Guidelines

ATM OAM F5 continuity checking enables OAM to support the use of F5 segment and end-to-end CC cells to detect connectivity failures.

It is not necessary to enter a CC configuration on the router at the other end of a segment. The router on which CC management has been configured sends a CC activation request to the router at the other end of the segment, directing it to act as either a source or a sink.

Use the **oam-pvc manage cc deny** command to configure a permanent virtual circuit (PVC) to respond to activation requests from a peer device with "activation denied" messages. The **oam-pvc manage cc deny** command prevents ATM OAM F5 CC management from being activated on the PVC.

Use the **no oam-pvc manage cc** command to send a deactivation request to the peer device. The **no oam-pvc manage cc** command will disable ATM OAM F5 CC management on the PVC until the PVC receives an activation request. When the PVC receives an activation request, ATM OAM F5 CC management will be reenabled.

The **no oam-pvc manage cc** {**end** | **segment**} **deactivate-down-vc** command does not disable ATM OAM F5 CC support. This command causes OAM F5 CC deactivation messages to be sent over the VC when the VC goes down.

To enable the SNMP notifications that support ATM OAM F5 continuity checking, use the **snmp-server enable traps atm pvc extension** command.

Examples

ATM OAM F5 CC Support on a PVC Configuration Example

The following example shows how to configure ATM OAM F5 CC support over the segment and configure the router to function as the source. The frequency at which CC activation and deactivation requests will be sent over the segment is also configured.

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

Deactivation of ATM OAM F5 CC upon VC Failure Example

The following example shows how to configure OAM to send a CC deactivation request across the segment when PVC 0/1 goes down:

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

Related Commands

Command	Description
debug atm oam cc	Displays ATM OAM F5 CC management activity.
oam-pvc manage cc deny	Disables ATM OAM F5 CC support and configures the PVC to deny CC activation requests.
oam retry cc	Sets the frequency at which ATM OAM F5 CC activation and deactivation requests are sent to the device at the other end of a segment or PVC.
show atm pvc	Displays all ATM PVCs and traffic information.

Command	Description
snmp-server enable traps atm pvc extension mibversion	Specifies the MIB that supports extended ATM PVC SNMP notifications or the MIB that supports SNMP notifications for ATM OAM F5 CC management, ATM OAM F5 AIS/RDI management, and F5 loopback failure management.
vpn service	Enables the sending of extended ATM PVC SNMP notifications and SNMP notifications for ATM OAM F5 CC, ATM OAM F5 AIS/RDI, and loopback failures.

oam-pvc

To enable end-to-end F5 Operation, Administration, and Maintenance (OAM) loopback cell generation and OAM management for an ATM permanent virtual circuit (PVC), virtual circuit (VC) class, or label-controlled ATM (LC-ATM) VC, use the **oam-pvc** command in the appropriate command mode. To disable generation of OAM loopback cells and OAM management, use the **no** form of this command.

ATM VC or VC Class

oam-pvc [**manage**] [*frequency*]

no oam-pvc [**manage**]

LC-ATM VC

oam-pvc manage [*frequency*]

no oam-pvc manage

Loopback Mode Detection

oam-pvc manage [*frequency*] **loop-detection**

no oam-pvc manage loop-detection

Syntax Description

manage	(Optional for ATM VCs or VC classes; required for LC-ATM VCs) Enables OAM management. The default is disabled.
frequency	(Optional) Time delay between transmitting OAM loopback cells. For ATM VCs or VC classes and loopback mode detection, the range of values is from 0 to 600 seconds. The default is 10 seconds. For LC-ATM VCs, the range of values is from 0 to 255 seconds. The default is 5 seconds.
loop-detection	Enables automatic detection of whether the physically connected ATM switch is in loopback mode. The default is disabled.

Command Default

Disabled.

Command Modes

Interface-ATM-VC configuration (for an ATM PVC or Loopback Mode Detection)
VC-class configuration (for a VC class)
PVC-in-range configuration (for an individual PVC within a PVC range)
Control-VC configuration (for enabling OAM management on an LC-ATM VC)

Command History

Release	Modification
11.3	This command was introduced.
12.1(5)T	This command was implemented in PVC-in-range configuration mode.

Release	Modification
12.3(2)T	This command was implemented for LC-ATM VCs.
12.0(30)S	The **loop-detection** keyword was added.

Usage Guidelines

If OAM management is enabled, further control of OAM management is configured using the **oam retry** command.

ATM VCS or VC Classes

If the **oam-pvc** command is not explicitly configured on an ATM PVC, the PVC inherits the following default configuration (listed in order of precedence):

- Configuration of the **oam-pvc** command in a VC class assigned to the PVC itself.
- Configuration of the **oam-pvc** command in a VC class assigned to the PVC's ATM subinterface.
- Configuration of the **oam-pvc** command in a VC class assigned to the PVC's ATM main interface.
- Global default: End-to-end F5 OAM loopback cell generation and OAM management are disabled, but if OAM cells are received, they are looped back. The default value for the *frequency* argument is 10 seconds.

Loopback Mode Detection

When a PVC traverses an ATM cloud and OAM is enabled, the router sends a loopback cell to the other end and waits for a response to determine whether the circuit is up. If an intervening router within the ATM cloud is in loopback mode, however, the router considers the circuit to be up, when in fact the other end is not reachable.

When enabled, the Loopback Mode Detection Through OAM feature detects when an intervening router is in loopback mode, in which case it sets the OAM state to NOT_VERIFIED. This prevents traffic from being routed on the PVC for as long as any intervening router is detected as being in loopback mode.

Examples

The following example shows how to enable end-to-end F5 OAM loopback cell transmission and OAM management on an ATM PVC with a transmission frequency of 3 seconds:

```
Router(cfg-mpls-atm-cvc)# oam-pvc manage 3
```

The following example shows how to enable end-to-end F5 OAM loopback cell transmission and OAM management on an LC-ATM interface with a transmission frequency of 2 seconds:

```
Router(config)# interface Switch1.10 mpls
Router(config-subif)# ip unnumbered Loopback0
Router(config-subif)# mpls atm control-vc 0 32
Router(cfg-mpls-atm-cvc)# oam-pvc manage 2
```

The following example shows how to create a PVC and enable loopback detection:

```
Router(config)# interface ATM1/0
Router(config-if)# pvc 4/100
Router(config-if-atm-vc)# oam-pvc manage loop-detection
```

Related Commands

Command	Description
ilmi manage	Enables ILMI management on an ATM PVC.
oam retry	Configures parameters related to OAM management for an ATM PVC, SVC, VC class, or LC-ATM VC.
show atm pvc	Displays all ATM PVCs and traffic information.

oam-range

To enable end-to-end F5 Operation, Administration, and Maintenance (OAM) loopback cell generation and OAM management for an ATM permanent virtual circuit (PVC) range, use the **oam-range** command in PVC range configuration mode. To disable generation of OAM loopback cells and OAM management, use the **no** form of this command.

oam-range [**manage**] [*frequency*]

no oam-range [**manage**] [*frequency*]

Syntax Description

manage	(Optional) Enables OAM management.
frequency	(Optional) Time delay (0 to 600 seconds) between transmissions of OAM loopback cells.

Defaults

10 seconds

Command Modes

PVC range configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Usage Guidelines

If OAM management is enabled, further control of OAM management is configured using the **oam retry** command.

If the **oam-range** command is not explicitly configured for an ATM PVC range, the range inherits the following default configuration (listed in order of precedence):

- Configuration of the **oam-range** command in a VC class assigned to the range.
- Configuration of the **oam-range** command in a VC class assigned to the ATM subinterface for the range.
- Configuration of the **oam-range** command in a VC class assigned to the ATM main interface for the range.
- Global default: End-to-end F5 OAM loopback cell generation and OAM management are disabled, but if OAM cells are received, they are looped back. The default value for the *frequency* argument is 10 seconds.

Examples

The following example enables end-to-end F5 OAM loopback cell transmission and OAM management on an ATM PVC range called “range1” with a transmission frequency of 11 seconds:

```
interface atm 6/0.1
 range range1 pvc 7/101 7/103
  oam-range manage 11
  oam retry 8 9 10
```

Related Commands

Command	Description
ilmi manage	Enables ILMI management on an ATM PVC.
oam-pvc	Enables end-to-end F5 OAM loopback cell generation and OAM management for an ATM PVC or VC class.
oam retry	Configures parameters related to OAM management for ATM PVC, SVC, or VC class.

oam-svc

To enable end-to-end F5 Operation, Administration, and Maintenance (OAM) loopback cell generation and OAM management for an ATM switched virtual circuit (SVC) or virtual circuit (VC) class, use the **oam-svc** command in the appropriate command mode. To disable generation of OAM loopback cells and OAM management, use the **no** form of this command.

oam-svc [**manage**] [*frequency*]

no oam-svc [**manage**] [*frequency*]

Syntax Description

manage	(Optional) Enable OAM management.
frequency	(Optional) Time delay (0 to 600 seconds) between transmitting OAM loopback cells.

Defaults

10 seconds

Command Modes

Interface-ATM-VC configuration (for an ATM SVC)
VC-class configuration (for a VC class)

Command History

Release	Modification
11.3	This command was introduced.

Usage Guidelines

If OAM management is enabled, further control of OAM management is configured using the **oam retry** command.

Note Generally, ATM signalling manages ATM SVCs. Configuring the **oam-svc** command on an SVC verifies the inband integrity of the SVC.

If the **oam-svc** command is not explicitly configured on an ATM SVC, the SVC inherits the following default configuration (listed in order of precedence):

- Configuration of the **oam-svc** command in a VC class assigned to the SVC itself.
- Configuration of the **oam-svc** command in a VC class assigned to the SVC's ATM subinterface.
- Configuration of the **oam-svc** command in a VC class assigned to the SVC's ATM main interface.
- Global default: End-to-end F5 OAM loopback cell generation and OAM management are disabled, but if OAM cells are received, they are looped back. The default value for *frequency* is 10 seconds.

Examples

The following example enables end-to-end F5 OAM loopback cell transmission and OAM management on an ATM SVC with a transmission frequency of 3 seconds:

```
oam-svc manage 3
```

Related Commands

Command	Description
oam retry	Configures parameters related to OAM management for an ATM PVC, SVC, or VC class.

partial-fill

To configure the number of AAL1 user octets per cell for the ATM circuit emulation service (CES) on the OC-3/STM-1 Circuit Emulation Service network module, use the **partial-fill** command in interface-CES-VC mode. To delete the CES partial-fill value, use the **no** form of this command.

partial-fill *octet*

no partial-fill *octet*

Syntax Description

octet	Number of user octets per cell for the CES. Possible values of octet range from 1 to 47.

Defaults

No partial-fill

Command Modes

Interface-CES-VC configuration

Command History

Release	Modification
12.1(2)T	This command was introduced.

Usage Guidelines

The **partial-fill** command applies to CES switched virtual circuits (SVCs) and permanent virtual circuits (PVCs) configured on Cisco 2600 series and Cisco 3600 series routers that have OC-3/STM-1 ATM CES network modules.

Examples

The following example sets the CES partial cell fill to 50 octets per cell for SVC “ces1”:

```
interface atm 1/0
 svc ces1 nsap 47.00.00......01.01.00 ces
  partial fill 40
```

Related Commands

Command	Description
svc	Creates an ATM SVC and specifies the destination NSAP address on a main interface or subinterface.

ping atm interface atm

To perform an ATM Operation Administration Maintenance (OAM) ping on a specific permanent virtual circuit (PVC), use the **ping atm interface atm** command in privileged EXEC mode.

ping atm interface atm *interface-number vpi-value vci-value* [**end-loopback** [*repeat* [*timeout*]] | **seg-loopback** [*repeat* [*timeout*]]]

Syntax Description

atm *interface_number*	ATM interface name.
vpi-value	Virtual path identifier. Range: 0 to 255.
vci-value	Virtual channel identifier. Range: 0 to 65535.
end-loopback	(Optional) Send ATM end loopback cells. This is the default.
seg-loopback	(Optional) Send ATM segment loopback cells.
repeat	(Optional) Number of ping packets that are sent to the destination address. Range: 1 to 1000. Default: 5.
timeout	(Optional) Timeout interval, in seconds. Range: 1 to 30. Default: 2.

Defaults

End loopback
Repeats: 5
Timeout interval: 2 seconds

Command Modes

Privileged EXEC

Command History

Release	Modification
11.4	This command was introduced on the LightStream 1010.
12.0(21)S	Support for this command was integrated into Cisco IOS Release 12.0(21)S.
12.2(13)T	Support for this command was integrated into Cisco IOS Release 12.2(13)T.
12.2(25)S	Support for this command was integrated into Cisco IOS Release 12.2(25)S.

Usage Guidelines

The **ping atm interface atm** command sends an OAM packet and indicates when a response is received. It can be used either in normal mode or in interactive mode. The **ping atm interface atm** command provides two ATM OAM ping options:

- End loopback—Verifies end-to-end PVC integrity.
- Segment loopback—Verifies PVC integrity to the neighboring ATM device.

Examples

In the following example, an ATM OAM ping with a 15-second timeout verifies end-to-end connectivity for PVC 0/500 in the normal mode:

```
Router# ping atm interface atm1/1.1 0 500 end-loopback 30 15

Type escape sequence to abort.
Sending 30, 53-byte end-to-end OAM echoes, timeout is 15 seconds:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Success rate is 100 percent (30/30), round-trip min/avg/max = 1/1/4 ms
```

In the following example, an ATM OAM ping verifies connectivity to the first-hop ATM switch on PVC 1/100 in the normal mode:

```
Router# ping atm interface atm1/1.1 0 500 seg-loopback 30 10

Type escape sequence to abort.
Sending 30, 53-byte segment OAM echoes, timeout is 10 seconds:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Success rate is 100 percent (30/30), round-trip min/avg/max = 1/1/4 ms
```

Table 2 describes the output of the **ping atm interface atm** command.

Table 2 ping atm Field Descriptions

Field	Description
Success rate is 100 percent	Percentage of packets successfully echoed back to the router. Anything less than 80 percent is usually considered problematic.
round-trip min/avg/max = 1/1/4 ms	Round-trip travel time intervals for the OAM loopback cells, including minimum/average/maximum (in milliseconds).
!!!!!!	Each exclamation point (!) indicates receipt of a reply. A period (.) indicates that an OAM response cell was not received within the timeout interval.

The following example verifies connectivity to the neighboring ATM device for the ATM PVC with the virtual path identifier (VPI) / virtual channel identifier (VCI) value 0/500 in the interactive mode:

```
Router# ping

Protocol [ip]:atm

ATM Interface:atm1/1.1

VPI value [0]:0

VCI value [1]:500

Loopback - End(0), Segment(1) [0]:1

Repeat Count [5]:
Timeout [2]:

Type escape sequence to abort.
Sending 5, 53-byte segment OAM echoes, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
```

Table 3 describes the **ping** fields shown in the display.

Table 3 ping Field Descriptions for ATM

Field	Description
Protocol [ip]:	Prompt for a supported protocol.
ATM Interface:	Prompt for the ATM interface.
VPI value [0]:	Prompt for the virtual path identifier. Default: 0.
VCI value [1]:	Prompt for the virtual channel identifier. Default: 1.
Loopback - End(0), Segment(1) [0]:	Prompt to specify end loopback, which verifies end-to-end PVC integrity, or segment loopback, which verifies PVC integrity to the neighboring ATM device. Default: end loopback.
Repeat Count [5]:	Number of ping packets that will be sent to the destination. Default: 5.
Timeout [2]:	Timeout interval, in seconds. Default: 2.

Related Commands

Command	Description
debug atm oam	Displays information about ATM OAM events.
show atm pvc	Displays the OAM status information.
show atm oam auto-detect	Displays ATM Operations and Maintenance (OAM) autodetect statistics.

protect

To configure a virtual circuit (VC) class with protected group or protected VC status for application to a VC bundle member, use the **protect** command in vc-class configuration mode. To remove the protected status from the VC class, use the **no** form of this command.

To configure a specific VC or permanent virtual circuit (PVC) as part of a protected group of the bundle or to configure it as an individually protected VC or PVC bundle member, use the **protect** command in bundle-vc configuration mode. To remove the protected status from the VC or PVC, use the **no** form of this command.

protect {**group** | **vc**}

no protect {**group** | **vc**}

Syntax Description

group	Configures the VC or PVC bundle member as part of the protected group of the bundle.
vc	Configures the VC or PVC member as individually protected.

Defaults

The VC or PVC neither belongs to the protected group nor is it an individually protected VC or PVC.

Command Modes

VC-class configuration (for a VC class)

Bundle-vc configuration (for ATM VC bundle members)

Command History

Release	Modification
12.0(3)T	This command was introduced.
12.0(23)S	This command was made available in vc-class and bundle-vc configuration modes on the 8-port OC-3 STM-1 ATM line card for Cisco 12000 series Internet routers.

Usage Guidelines

Use the **protect** command in vc-class configuration mode to configure a VC class to contain protected group or individual protected VC status. When the class is applied to the VC bundle member, that VC is characterized by the protected status. You can also apply this command directly to a VC in bundle-vc configuration mode.

When a protected VC goes down, it takes the bundle down. When all members of a protected group go down, the bundle goes down.

To use the **protect** command in vc-class configuration mode, first enter the **vc-class atm** global configuration command.

The **protect** command has no effect if the VC class that contains the command is attached to a standalone VC, that is, if the VC is not a bundle member.

To use the **protect** command in bundle-vc configuration mode, first enter the **bundle** command to enact bundle configuration mode for the bundle containing the VC member to be configured. Then enter the **pvc-bundle** configuration command to add the VC to the bundle as a member of it.

VCs in a VC bundle are subject to the following configuration inheritance guidelines (listed in order of next highest precedence):

- VC configuration in bundle-vc mode
- Bundle configuration in bundle mode (with effect of assigned vc-class configuration)
- Subinterface configuration in subinterface mode

Examples

The following example configures a class called "control-class" to include a **protect** command, which, when applied to a VC bundle member, configures the VC as an individually protected VC bundle member. When this protected VC goes down, it takes the bundle down.

```
vc-class atm control-class
 protect vc
```

Related Commands

Command	Description
bump	Configures the bumping rules for a VC class that can be assigned to a VC bundle.
bundle	Creates a bundle or modifies an existing bundle to enter bundle configuration mode.
class-vc	Assigns a VC class to an ATM PVC, SVC, or VC bundle member.
precedence	Configures precedence levels for a VC class that can be assigned to a VC bundle and thus applied to all VC members of that bundle; configures precedence levels for an individual VC or PVC bundle member.
pvc	Creates or assigns a name to an ATM PVC, specifies the encapsulation type on an ATM PVC, and enters interface-ATM-VC configuration mode.
pvc-bundle	Adds a PVC to a bundle as a member of the bundle and enters bundle-vc configuration mode in order to configure that PVC bundle member.
ubr	Configures UBR QoS and specifies the output peak cell rate for an ATM PVC, SVC, VC class, or VC bundle member.
ubr+	Configures UBR QoS and specifies the output peak cell rate and output minimum guaranteed cell rate for an ATM PVC, SVC, VC class, or VC bundle member.
vbr-nrt	Configures the VBR-NRT QoS and specifies output peak cell rate, output sustainable cell rate, and output maximum burst cell size for an ATM PVC, SVC, VC class, or VC bundle member.
vc-class atm	Configures a VC class for an ATM VC or interface.

protocol (ATM)

To configure a static map for an ATM permanent virtual circuit (PVC), switched virtual circuit (SVC), or virtual circuit (VC) class or to enable Inverse Address Resolution Protocol (ARP) or Inverse ARP broadcasts on an ATM PVC, use the **protocol** command in the appropriate mode. To remove a static map or disable Inverse ARP, use the **no** form of this command.

protocol *protocol* {*protocol-address* [**virtual-template**] | **inarp**} [[**no**] **broadcast**]

no protocol *protocol* {*protocol-address* [**virtual-template**] | **inarp**} [[**no**] **broadcast**]

Syntax Description

protocol	Choose one of the following values: **aarp**—AppleTalk ARP **appletalk**—AppleTalk **arp**—IP ARP **bridge**—bridging **bstun**—block serial tunnel **cdp**—Cisco Discovery Protocol **clns**—ISO Connectionless Network Service (CLNS) **clns_es**—ISO CLNS end system **clns_is**—ISO CLNS intermediate system **cmns**—ISO CMNS **compressedtcp**—Compressed TCP **decnet**—DECnet **decnet_node**—DECnet node **decnet_prime_router**—DECnet prime router **decnet_router-l1**—DECnet router L1 **decnet_router-l2**—DECnet router L2 **dlsw**—data link switching **ip**—IP **ipx**—Novell IPX **llc2**—llc2 **pad**—packet assembler/disassembler (PAD) links **ppp**—Point-to-Point Protocol carried on the VC **pppoe**—PPP over Ethernet **qllc**—Qualified Logical Link Control protocol **rsrb**—remote source-route bridging **snapshot**—snapshot routing support **stun**—serial tunnel
protocol-address	Destination address that is being mapped to a PVC.
virtual-template	(Optional) Specifies parameters that the point-to-point protocol over ATM (PPoA) sessions will use. **Note** This keyword is valid only for the **ppp** protocol.

inarp	(Valid only for IP and IPX protocols on PVCs) Enables Inverse ARP on an ATM PVC. If you specify a *protocol-address* instead of **inarp**, Inverse ARP is automatically disabled for that protocol.
[**no**] **broadcast**	(Optional) **broadcast** indicates that this map entry is used when the corresponding protocol sends broadcast packets to the interface. Pseudobroadcasting is supported. The **broadcast** keyword of the **protocol** command takes precedence if you previously configured the **broadcast** command on the ATM PVC or SVC.

Defaults

Inverse ARP is enabled for IP and IPX if the protocol is running on the interface and no static map is configured.

Command Modes

Interface-ATM-VC configuration (for an ATM PVC or SVC)
VC-class configuration (for a VC class)
PVC range configuration (for an ATM PVC range)
PVC-in-range configuration (for an individual PVC within a PVC range)

Command History

Release	Modification
11.3	This command was introduced.
12.1	The **ppp** and **virtual-template** keywords were added.
12.1(5)T	The **ip** and **ipx** options were made available in PVC range and PVC-in-range configuration modes.
12.2(13)T	The **apollo**, **vines**, **and xns** arguments were removed because Apollo Domain, Banyan VINES, and Xerox Network Systems are no longer supported in the Cisco IOS software.

Usage Guidelines

Command Application

Use this command to perform either of the following tasks:

- Configure a static map for an ATM PVC, SVC, or VC class.
- Enable Inverse ARP or Inverse ARP broadcasts on an ATM PVC or PVC range by configuring Inverse ARP directly on the PVC, in the PVC range, or in a VC class (applies to IP and IPX protocols only).

PVC range and PVC-in-range configuration modes support only the protocols that do not require static map configuration. Those protocol options are **ip** and **ipx**.

Default Configurations

If the **protocol** command is not explicitly configured on an ATM PVC or SVC, the VC inherits the following default configuration (listed in order of precedence):

- Configuration of the **protocol ip inarp** or **protocol ipx inarp** command in a VC class assigned to the PVC or SVC itself.
- Configuration of the **protocol ip inarp** or **protocol ipx inarp** command in a VC class assigned to the ATM subinterface of the PVC or SVC.

- Configuration of the **protocol ip inarp** or **protocol ipx inarp** command in a VC class assigned to the ATM main interface of the PVC or SVC.
- Global default: Inverse ARP is enabled for IP and IPX if the protocol is running on the interface and no static map is configured.

Examples

The following example creates a static map on a VC, indicates that 10.68.34.237 is connected to this VC, and sends ATM pseudobroadcasts:

```
protocol ip 10.68.34.237 broadcast
```

The following example enables Inverse ARP for IPX and does not send ATM pseudobroadcasts:

```
protocol ipx inarp no broadcast
```

The following example removes a static map from a VC and restores the default behavior for Inverse ARP (Refer to the "Default" section described above):

```
no protocol ip 10.68.34.237
```

In the following example, the VC carries PPP traffic and its associated parameters.

```
protocol ppp 10.68.34.237 virtual-template
```

pvc

To create or assign a name to an ATM permanent virtual circuit (PVC), to specify the encapsulation type on an ATM PVC, and to enter ATM virtual circuit configuration mode, use the **pvc** command in interface configuration mode or subinterface configuration mode. To remove an ATM PVC from an interface, use the **no** form of this command.

pvc [*name*] *vpi*/*vci* [**ces** | **ilmi** | **qsaal** | **smds** | **l2transport**]

no pvc [*name*] ***vpi*/*vci*** [**ces** | **ilmi** | **qsaal** | **smds** | **l2transport**]

Syntax Description

name	(Optional) The name of the PVC or map. The name can be up to 15 characters long.
vpi/	ATM network virtual path identifier (VPI) for this PVC. The absence of the "/" and a *vpi* value causes the *vpi* value to default to 0. The range of valid values is 0 to 255 except for the following routers: • Cisco 4500 and 4700 routers: 0 to 1 less than the quotient of 8192 divided by the value set by the **atm vc-per-vp** command. • Cisco 2600 and 3600 series routers using Inverse Multiplexing for ATM (IMA): 0 to 15, 64 to 79, 128 to 143, and 192 to 207. A value that is out of range is interpreted as a string and is treated as the connection ID. The arguments *vpi* and *vci* cannot both be set to 0; if one is 0, the other cannot be 0.
vci	ATM network virtual channel identifier (VCI) for this PVC. This value ranges from 0 to 1 less than the maximum value set for this interface by the **atm vc-per-vp** command. Typically, lower values from 0 to 31 are reserved for specific traffic (for example, F4 OAM, SVC signaling, ILMI, and so on) and should not be used. The VCI is a 16-bit field in the header of the ATM cell. The VCI value is unique only on a single link, not throughout the ATM network, because it has local significance only. A value that is out of range causes an "unrecognized command" error message. The arguments *vpi* and *vci* cannot both be set to 0; if one is 0, the other cannot be 0.
ces	(Optional) Circuit Emulation Service encapsulation. This keyword is available on the OC-3/STM-1 ATM Circuit Emulation Service network module and on AIM-ATM and AIM-ATM-VOICE-30 network modules only.
ilmi	(Optional) Sets up communication with the Interim Local Management Interface (ILMI); the associated *vpi* and *vci* values ordinarily are 0 and 16, respectively.

qsaal	(Optional) A signaling-type PVC used for setting up or tearing down SVCs; the associated *vpi* and *vci* values ordinarily are 0 and 5, respectively.
smds	(Optional) Encapsulation for SMDS networks. If you are configuring an ATM PVC on the ATM Interface Processor (AIP), you must configure AAL3/4SMDS using the **atm aal aal3/4** command before specifying **smds** encapsulation. If you are configuring an ATM network processor module (NPM), the **atm aal aal3/4** command is not required. SMDS encapsulation is not supported on the ATM port adapter.
l2transport	(Optional) Specifies that the PVC is switched and not terminated.

Defaults

No PVC is defined. When a PVC is defined, the global default of the **encapsulation** command applies (**aal5snap**).

Command Modes

Interface configuration
Subinterface configuration

Command History

Release	Modification
11.3 T	This command was introduced.
12.1(2)T	The ranges for the VPI were increased for Cisco 2600 and Cisco 3600 series routers using Inverse Multiplexing for ATM (IMA). The **ces** keyword was added for configuring CES encapsulation when using the OC-3/STM-1 ATM Circuit Emulation Service network module on Cisco 2600 and Cisco 3600 series routers.
12.1(5)XM	This command was extended to the merged Simple Gateway Control Protocol (SGCP)/Media Gateway Control Protocol (MGCP) software.
12.2(2)T	This command was integrated into Cisco IOS Release 12.2(2)T.
12.0(23)S	The **l2transport** keyword was added.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.
12.3(8)T	The **ces** keyword was added to AIM-ATM and AIM-ATM-VOICE-30 network modules.

Usage Guidelines

Creating and Configuring PVCs

The **pvc** command replaces the **atm pvc** command. Use the **pvc** command to configure a single ATM VC only, not a VC that is a bundle member. We recommend that you use the **pvc** command in conjunction with the **encapsulation** and **random-detect attach** commands instead of the **atm pvc** command.

The **pvc** command creates a PVC and attaches it to the VPI and VCI specified. Both the *vpi* and *vci* arguments cannot be simultaneously specified as 0; if one is 0, the other cannot be 0.

When configuring an SVC, use the **pvc** command to configure the PVC that handles SVC call setup and termination. In this case, specify the **qsaal** keyword. See the second example that follows.

ATM PVC Names

Once you specify a name for a PVC, you can reenter ATM virtual circuit configuration mode by simply entering the **pvc** *name* command. You can remove a PVC and any associated parameters by entering **no pvc** *name* or **no pvc** *vpi*/*vci*.

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

Encapsulation Types on ATM PVCs

Specify CES, ILMI, QSAAL, or SMDS as the encapsulation type on an ATM PVC. (To configure other encapsulations types, see the **encapsulation** command.)

Configuring CES encapsulation on a PVC is equivalent to creating a constant bit rate (CBR) class of service.

Rate Queues

The Cisco IOS software dynamically creates rate queues as necessary to satisfy the requests of the **pvc** commands.

Default Configurations

If **ilmi**, **qsaal**, or **smds** encapsulation is not explicitly configured on the ATM PVC, the PVC inherits the following default configuration (listed in order of precedence):

- Configuration of the **encapsulation** command in a VC class assigned to the PVC itself.
- Configuration of the **encapsulation** command in a VC class assigned to the ATM subinterface of the PVC.
- Configuration of the **encapsulation** command in a VC class assigned to the ATM main interface of the PVC.
- Global default: The global default value of the **encapsulation** command applies (**aal5snap**).

Examples

The following example creates a PVC with VPI 0 and VCI 16, and communication is set up with the ILMI:

```
pvc cisco 0/16 ilmi
 exit
```

The following example creates a PVC used for ATM signaling for an SVC. It specifies VPI 0 and VCI 5:

```
pvc cisco 0/5 qsaal
 exit
```

The following example configures the PVC called “cisco” to use class-based weighted fair queueing (CBWFQ). It attaches a policy map called “policy1” to the PVC. The classes that make up “policy1” determine the service policy for the PVC:

```
pvc cisco 0/5
 service-policy output policy1
 vbr-nrt 2000 2000
 encap aal5snap
```

Related Commands

Command	Description
atm vc-per-vp	Sets the maximum number of VCIs to support per VPI.
pvc-bundle	Adds a PVC to a bundle as a member of the bundle.

qos-group (ATM VC bundle member)

To associate a quality of service (QoS) group or groups with a permanent virtual circuit (PVC) bundle member, use the **qos-group** command in ATM VC bundle-member configuration mode. To disassociate a QoS group or groups from a PVC bundle member, use the **no** form of this command.

qos-group *qos-groups*

no qos-group *qos-groups*

Syntax Description

qos-groups	QoS group or groups. You can specify a QoS group, a range of QoS groups, or any combination of QoS groups and ranges of QoS groups separated by commas. Specify a range by entering the starting and ending QoS group numbers separated by a hyphen (-).

Command Default

No QoS groups are associated with the PVC bundle member.

Command Modes

ATM VC bundle-member configuration

Command History

Release	Modification
12.4(4)T	This command was introduced.

Examples

The following example associates a single QoS group with a PVC bundle member:

```
Router> enable
Password:
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface atm 2/0
Router(config-subif)# bundle cisco
Router(config-if-atm-bundle)# selection-method qos-group
Router(config-if-atm-bundle)# pvc 1/32
Router(config-if-atm-member)# qos-group 1
Router(config-if-atm-member)# end
```

The following example associates a range of QoS groups from 1 to 5 with a PVC bundle member:

```
Router> enable
Password:
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface atm 2/0
Router(config-subif)# bundle cisco
Router(config-if-atm-bundle)# selection-method qos-group
Router(config-if-atm-bundle)# pvc 1/32
Router(config-if-atm-member)# qos-group 1-5
Router(config-if-atm-member)# end
```

The following example associates QoS groups 1 and 7 with a PVC bundle member:

```
Router> enable
Password:
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface atm 2/0
Router(config-subif)# bundle cisco
Router(config-if-atm-bundle)# selection-method qos-group
Router(config-if-atm-bundle)# pvc 1/32
Router(config-if-atm-member)# qos-group 1,7
Router(config-if-atm-member)# end
```

The following example associates a range of QoS groups 1 to 5 and a range of QoS groups 7-10 with a PVC bundle member:

```
Router> enable
Password:
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface atm 2/0
Router(config-subif)# bundle cisco
Router(config-if-atm-bundle)# selection-method qos-group
Router(config-if-atm-bundle)# pvc 1/32
Router(config-if-atm-member)# qos-group 1-5,7-10
Router(config-if-atm-member)# end
```

Related Commands

Command	Description
inarp-vc	Enables InARP for a PVC bundle member.
selection-method	Specifies the method for selection of the PVC bundle member.

retry (SVC)

To configure a router to periodically attempt to bring up an active switched virtual circuit (SVC) connection after the initial call setup failed, use the **retry** command in interface-CES-VC configuration mode. To disable the retry mechanism, use the **no** form of this command.

retry *timeout-value* [*retry-limit*] [*first-retry-interval*]

no retry

Syntax Description

timeout-value	Number of seconds between attempts to bring up the connection. The range is from 1 to 86400 seconds.
retry-limit	(Optional) Number of attempts the router will make to bring up the connection. The range is from 0 to 65535. The default value of 0 indicates no limit.
first-retry-interval	(Optional) Number of seconds the router will wait after the first call attempt failed before trying the call again. The default is 10 seconds.

Defaults

There is no default *timeout-value*.
retry-limit: 0
*first-retry-interva*l: 10 seconds

Command Modes

Interface-CES-VC configuration

Command History

Release	Modification
12.1(2)T	This command was introduced.

Usage Guidelines

This command is used on Cisco 2600 series and 3600 series routers that have OC-3/STM-1 ATM CES network modules.

The **retry** command applies only to active SVCs.

Examples

In the following example, the router is configured to make up to 20 attempts to bring up a connection on SVC “ces1”. The interval between attempts is set at 10 seconds.

```
interface atm 1/0
 svc ces1 nsap 47.0091.81.000000.0040.0B0A.2501.ABC1.3333.3333.05 ces
  retry 10 20
```

Related Commands

Command	Description
ces	Configures CES on a router port and enters CES configuration mode.
svc	Creates an ATM SVC and specifies the destination NSAP address on a main interface or subinterface.

scrambling cell-payload

To improve data reliability by randomizing the ATM cell payload frames on Cisco 7100, 7200, or 7500 series routers, use the **scrambling cell-payload** command in interface configuration mode. To disable scrambling, use the **no** form of this command.

scrambling cell-payload

no scrambling cell-payload

Syntax Description

This command has no arguments or keywords.

Defaults

No scrambling

Command Modes

Interface configuration

Command History

Release	Modification
12.0(5)XE	This command was introduced.
12.0(7)XE1	Support for Cisco 7100 series routers added.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.

Usage Guidelines

Normally, you do not issue the **scrambling cell-payload** command explicitly, because the default value is sufficient. On T1 links, the default b8zs line encoding normally assures sufficient reliability. The default for E1 is hdb3.

The scrambling setting must match that of the far-end receiver.

Examples

On Cisco 7100 or 7200 series routers, the following example sets the link on interface 1 on the port adapter in slot 0 to no scrambling:

```
interface atm0/1
 no scrambling cell-payload
```

Related Commands

Command	Description
scrambling-payload	Improves data reliability by randomizing the ATM cell payload frames on Cisco 2600 and 3600 series routers.

scrambling-payload

To improve data reliability by randomizing the ATM cell payload frames on Cisco 2600 or 3600 series routers, use the **scrambling-payload** command in interface configuration mode. To disable scrambling, use the **no** form of this command.

scrambling-payload

no scrambling-payload

Syntax Description

This command has no arguments or keywords.

Defaults

By default, payload scrambling is on for E1 links and off for T1 links.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(5)XK	This command was introduced.
12.0(5)T	This command was integrated into Cisco IOS Release 12.0(5)T.

Usage Guidelines

Normally, you do not issue the **scrambling-payload** command explicitly, because the default value is sufficient. On T1 links, the default b8zs line encoding normally assures sufficient reliability.

The scrambling setting must match that of the far end.

Examples

On a Cisco 2600 or 3600 series router, the following example sets the link on interface 1 on the module in slot 0 to no scrambling:

```
interface atm0/1
 no scrambling-payload
```

Related Commands

Command	Description
scrambling cell-payload	Improves data reliability by randomizing the ATM cell payload frames on Cisco 7100, 7200, or 7500 series routers.

selection-method

To specify the method for selection of permanent virtual circuit (PVC) bundle members, use the **selection-method** command in ATM VC bundle configuration mode. To disable a selection method, use the **no** form of this command.

selection-method {**qos-group** | **tos-exp**}

no selection-method {**qos-group** | **tos-exp**}

Syntax Description

qos-group	Use the quality of service (QoS) group value associated with each packet for selection of PVC bundle members.
tos-exp	Use ToS bit settings of each packet (for IP packets) or EXP bit settings of each packet (for Multiprotocol Label Switching (MPLS) packets) for selection of PVC bundle members.

Command Default

No selection method is set.

Command Modes

ATM VC bundle configuration

Command History

Release	Modification
12.4(4)T	This command was introduced.

Usage Guidelines

You can change the selection method from QoS groups to ToS or EXP only if none of the PVC bundle members have QoS groups or Inverse Address Resolution Protocol (InARP) configured.

You can change the selection method from ToS or EXP to QoS groups only if none of the PVC bundle members have precedence, protection, or bumping configured.

Examples

The following example specifies the QoS group selection method for a PVC bundle and associates a QoS group with a member of the PVC bundle:

```
Router> enable
Password:
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface atm 2/0
Router(config-subif)# bundle cisco
Router(config-if-atm-bundle)# selection-method qos-group
Router(config-if-atm-bundle)# pvc 1/32
Router(config-if-atm-member)# qos-group 1
Router(config-if-atm-member)# end
```

The following example specifies the ToS or EXP selection method for a PVC bundle:

```
Router> enable
Password:
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface atm 2/0
Router(config-subif)# bundle cisco
Router(config-if-atm-bundle)# selection-method tos-exp
Router(config-if-atm-member)# end
```

Related Commands

Command	Description
inarp-vc	Enables InARP for a PVC bundle member.
qos-group (ATM VC bundle member)	Associates a QoS group or groups with a PVC bundle member.

shortcut-frame-count

To specify the maximum number of times a packet can be routed to the default router within shortcut-frame time before a Multiprotocol over ATM (MPOA) resolution request is sent, use the **shortcut-frame-count** command in MPC configuration mode. To restore the default shortcut-setup frame count value, use the **no** form of this command.

shortcut-frame-count *count*

no shortcut-frame-count

Syntax Description

count	Shortcut-setup frame count. The default is 10 frames.

Defaults

The default is 10 frames.

Command Modes

MPC configuration

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Examples

The following example shows how to set the shortcut-setup frame count to 5 for the MPC:

```
Router(mpoa-client-config)# shortcut-frame-count 5
```

Related Commands

Command	Description
atm-address	Overrides the control ATM address of an MPC or MPS.
mpoa client config name	Defines an MPC with a specified name.
shortcut-frame-time	Sets the shortcut-setup frame time (in seconds) for the MPC.

shortcut-frame-time

To set the shortcut-setup frame time (in seconds) for the Multiprotocol over ATM (MPOA) client (MPC), use the **shortcut-frame-time** command in MPC configuration mode. To restore the default shortcut-setup frame-time value, use the **no** form of this command.

shortcut-frame-time *time*

no shortcut-frame-time

Syntax Description

time	Shortcut-setup frame time (in seconds).

Defaults

The default is 1 second.

Command Modes

MPC configuration

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Examples

The following example shows how to set the shortcut-setup frame time to 7 for the MPC:

```
Router(mpoa-client-config)# shortcut-frame-time 7
```

Related Commands

Command	Description
atm-address	Overrides the control ATM address of an MPC or MPS.
mpoa client config name	Defines an MPC with a specified name.
shortcut-frame-count	Specifies the maximum number of times a packet can be routed to the default router within shortcut-frame time before an MPOA resolution request is sent.

show atm arp-server

To display the ATM Address Resolution Protocol (ARP) server's information about one specific interface or all interfaces, use the **show atm arp-server** user EXEC command.

AIP on Cisco 7500 series with AIP; Cisco 7200 series with ATM, ATM-CES, and enhanced ATM port adapters; Cisco 2600 and 3600 series with 1-port ATM-25 network module

show atm arp-server [**atm** *slot*/*port*[**.***subinterface-number*]]

Cisco 7500 series with ATM and enhanced ATM port adapters

show atm arp-server [**atm** *slot*/*port-adapter*/*port*[**.***subinterface-number*]]

Cisco 4500 and 4700 series with NPM

show atm arp-server [**atm** *number*[**.***subinterface-number*]]

Syntax Description

atm *slot*/*port*	(Optional) ATM slot and port numbers. Use this format for the following platform configurations: • AIP on Cisco 7500 series routers. • ATM port adapter, ATM-CES port adapter, and enhanced ATM port adapter on Cisco 7200 series routers. • 1-port ATM-25 network module on Cisco 2600 and 3600 series routers.
atm *slot*/*port-adapter*/*port*	(Optional) ATM slot, port adapter, and port numbers. Use this format for the ATM port adapter or enhanced ATM port adapter on Cisco 7500 series routers.
atm *number*	(Optional) ATM network processor module (NPM) number on Cisco 4500 and 4700 routers.
.*subinterface-number*	(Optional) Subinterface number.

Command Modes

User EXEC

Command History

Release	Modification
11.1	This command was introduced.

Examples

The following is sample output from the **show atm arp-server** command when no interface is specified:

```
Router# show atm arp-server

Note that a '*' next to an IP address indicates an active call

      IP Address        TTL     ATM Address
ATM1/0:
    * 4.4.4.2           19:50   ac153366020000000000000000000000000000000000
    * 4.4.4.6           19:50   ac153366060000000000000000000000000000000000
    * 4.4.4.15          19:14   ac153366150000000000000000000000000000000000

ATM1/0.23:
    * 10.0.0.2          19:50   ac153366020000000000000000000000000000000023
    * 10.0.0.6          19:50   ac153366060000000000000000000000000000000023
```

The following is sample output from the **show atm arp-server** command when a slot and port are specified on the Cisco 7500:

```
Router# show atm arp-server atm 1/0

Note that a '*' next to an IP address indicates an active call

      IP Address        TTL     ATM Address
    * 4.4.4.2           19:00   ac153366020000000000000000000000000000000000
    * 4.4.4.6           19:00   ac153366060000000000000000000000000000000000
    * 4.4.4.15          19:14   ac153366150000000000000000000000000000000000
```

Related Commands

Command	Description
atm arp-server	Identifies an ATM ARP server for the IP network or sets TTL values for entries in the ATM ARP table.

show atm class-links

To display virtual circuit (VC) parameter configurations and where the parameter values are inherited from, use the **show atm class-links** command in privileged EXEC mode.

show atm class-links {*vpi*/*vci* | *name*}

Syntax Description

vpi/*vci*	The ATM VPI and VCI numbers. The absence of the slash character (**/**) and a *vpi* value defaults the *vpi* value to 0.
name	Name of the VC.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.3	This command was introduced.

Examples

The following is sample output from the **show atm class-links** command for VPI 0 and VCI 66:

```
Router# show atm class-links 0/66

Displaying vc-class inheritance for ATM2/0.3, vc 0/66:
broadcast - VC-class configured on main-interface
encapsulation aal5mux ip - VC-class configured on subinterface
no ilmi manage - Not configured - using default
oam-pvc manage 3 - VC-class configured on vc
oam retry 3 5 1 - Not configured - using default
ubr 10000 - Configured on vc directly
```

show atm ilmi-configuration

To display ILMI configuration information, use the **show atm ilmi-configuration** command in privileged EXEC mode.

show atm ilmi-configuration

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.0	This command was introduced prior to Cisco IOS Release 12.0.

Examples

The following example shows sample output for the **show atm ilmi-configuration** command:

```
Router# show atm ilmi-configuration

LECS Address(s):
11223344556677889900112233445566778899 00
```

Table 4 describes the fields shown in the display.

Table 4 show atm ilmi-configuration Field Descriptions

Field	Description
LECS Address(s)	Current ATM LAN Emulation Clients (LECs) addresses.

Related Commands

Command	Description
show atm ilmi-status	Displays ILMI-related status information.

show atm ilmi-status

To display ILMI-related status information, use the **show atm ilmi-status** command in privileged EXEC mode.

show atm ilmi-status [**atm** *interface-number*]

Syntax Description

atm	(Optional) ATM interface.
interface-number	(Optional) Number of the ATM interface.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.0	This command was introduced in a release prior to Cisco IOS Release 12.0.

Usage Guidelines

Entering the **show atm ilmi-status** command without specifying an interface will display ILMI-related status information for all of the ATM interfaces.

Examples

The following example is sample output for the **show atm ilmi-status** command:

```
Router# show atm ilmi-status

Interface :ATM2/0 Interface Type :Unknown
ILMI VCC :(0, 16) ILMI Keepalive :Disabled
ILMI State:      Restarting

Interface :ATM5/0 Interface Type :Private UNI (User-side)
ILMI VCC :(0, 16) ILMI Keepalive :Disabled
ILMI State:      UpAndNormal
Peer IP Addr:    10.0.52.17      Peer IF Name:    ATM1/1/0
Peer MaxVPIbits: 8               Peer MaxVCIbits: 14
Active Prefix(s) :
47.0091.8100.0000.0040.0b0a.2501
End-System Registered Address(s) :
47.0091.8100.0000.0040.0b0a.2501.bbbb.ccdd.eeff.12(Confirmed)
```

Table 5 describes the fields shown in the display.

Table 5 show atm ilmi-status Field Descriptions

Field	Description
interface	ATM interface.
Interface Type	Type of ATM interface.
ILMI VCC	Number of the current ILMI VCC for the interface.
ILMI Keepalive	Status of ILMI keepalive packets.

Table 5 show atm ilmi-status Field Descriptions (continued)

Field	Description
ILMI State	Status of ILMI for the interface.
Peer IP Addr	IP address of the peer.
Peer IF Name	Name of the peer interface.
Peer Max VPIbits	Maximum number of bits allowed for VPIs on the peer interface.
Peer Max VCIbits	Maximum number of bits allowed for VCIs on the peer interface.
Active Prefix	Network prefix that is registered from the switch side and is active and valid.
End-System Registered Address(s)	Address that the router registers back to the switch. The router combines the network prefix of the switch with the end-system identifier to form the end-system registered address.

Related Commands

Command	Description
show atm ilmi-configuration	Displays ILMI configuration information.

show atm interface atm

To display ATM-specific information about an ATM interface, use the **show atm interface atm** command in privileged EXEC mode.

Cisco 7500 series with AIP; Cisco 7200 series with ATM, ATM-CES, and enhanced ATM port adapters; Cisco 2600 and 3600 series with 1-port ATM-25 network module

show atm interface atm *slot/port*

Cisco 7500 series with ATM and enhanced ATM port adapters

show atm interface atm *slot/port-adapter/port*

Cisco 4500 and 4700 series with NPM

show atm interface atm *number*

Syntax Description

slot/port	ATM slot number and port number. Use this format on the following platform configurations: • The AIP on Cisco 7500 series routers. • The ATM port adapter, ATM-CES port adapter, or enhanced ATM port adapter on Cisco 7200 series routers. • The 1-port ATM-25 network module on Cisco 2600 and 3600 series routers.
slot/port-adapter/port	ATM slot, port adapter, and port number. Use this format on the ATM port adapter or ATM-CES port adapter on Cisco 7500 series routers.
number	NPM number for Cisco 4500 and 4700 routers.

Command Modes

Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.
11.0	The *number* argument was added.
11.2	The *slot/port-adapter/port* arguments were added.

Examples

The following is sample output for the ATM-CES port adapter to display statistics on slot 4, port 0:

```
Router# show atm interface atm 4/0

ATM interface ATM4/0:
AAL enabled: AAL5, Maximum VCs: 1024, Current VCs: 6
Tx buffers 256, Rx buffers 256, Exception Queue: 32, Raw Queue: 32
VP Filter: 0x7B, VCIs per VPI: 1024, Max Datagram Size:4496, MIDs/VC:16
PLIM Type:4B5B - 100Mbps, No Framing, TX clocking: LINE
4897 input, 2900 output, 0 IN fast, 0 OUT fast
```

```
Rate-Queue 1 set to 100Mbps, reg=0x4EA DYNAMIC, 1 VCCs
ATM4/0.1:AAL3/4-SMDS address c111.1111.1111 Multicast e222.2222.222
Config. is ACTIVE
```

The following is sample output for the enhanced ATM port adapter to display statistics on slot 6, port 0:

```
Router# show atm interface atm 6/0

ATM interface ATM6/0
AAL enabled:  AAL5, Maximum VCs: 2048, Current VCs: 3
Maximum Transmit Channels: 64
Tx buffers: 256, Rx buffers 256, Exception Queue: 32, Raw Queue: 32
VP Filter: 0x7B, VCIs per VPI: 1024, Max Datagram Size: 4496
PLIM Type: SONET - 155Mbps, TX clocking: INTERNAL
0 input, 59 output, 0 IN fast, 0 OUT fast
ABR parameters, rif: 16 rdf: 16
Config. is ACTIVE
```

Table 6 describes the fields shown in the display.

Table 6 show atm interface atm Field Descriptions

Field	Description
ATM interface	Slot and port number of the interface.
AAL enabled	Type of AAL. If both AAL5 and AAL3/4 are enabled on the interface, the output will include both AAL5 and AAL3/4.
Maximum VCs	Maximum number of virtual circuits this interface can support.
Current VCs	Number of active virtual circuits.
Tx buffers, Rx buffers	Number of transmit and receive buffers.
Exception Queue	Number of exception buffers.
Raw Queue	Queue size.
VP Filter	Hexadecimal value of the VP filter.
VCIs per VPI	Maximum number of VCIs to support per VPI.
Max Datagram Size	The configured maximum number of bytes in the largest datagram.
MIDs/VC	The configured maximum number of message identifiers allowed per virtual circuit on this interface.
PLIM Type	Physical Layer Interface Module (PLIM) type (E3, 4B/5B, or SONET).
Framing	For E3, this might be G.804; otherwise, no framing.
TX clocking	Clocking on the router. For E3 or SONET, this might be INTERNAL, meaning that the AIP or NPM generates the clock. Otherwise, LINE indicates that the ATM switch provides the clocking.
input	Number of packets received and process-switched.
output	Number of packets sent from process switch.
IN fast	Number of input packets fast-switched.
OUT fast	Number of output packets fast-switched.

Table 6 show atm interface atm Field Descriptions (continued)

Field	Description
ABR parameters, rif rdf	The amount that the cell transmission rate increases or decreases in response to flow control information from the network or destination for available bit rate (ABR) PVCs. The rate increase factor (RIF) and rate decrease factor (RDF) in this example are 16, the default.
Rate-Queue	List of configured rate queues.
reg=	Actual register value passed to the AIP to define a specific rate queue (AIP only).
DYNAMIC	Indicates that the rate queue is dynamic and was created automatically by the software. Dynamic rate queues are created when an **atm pvc** command specifies a peak or average rate that does not match any user configured rate queue. The value PERMANENT indicates that the rate queue was user-configured.
VCCs	Number of virtual channel connections (VCCs) dynamically attached to this rate queue.
ATM4/0.1	Indicates that the subinterface supports ATM adaptation layer AAL3/4 and displays the SMDS E.164 unicast address and the SMDS E.164 multicast address assigned to the subinterface.
Config. is	ACTIVE or VALID in *n* SECONDS. ACTIVE indicates that the current AIP or NPM configuration has been loaded into the AIP and is being used. There is a 5-second window when a user changes a configuration and the configuration is sent to the AIP.

Related Commands

Command	Description
pvc	Configures the PVC interface.

show atm map

To display the list of all configured ATM static maps to remote hosts on an ATM network and on ATM bundle maps, use the **show atm map** command in user EXEC or privileged mode.

show atm map

Syntax Description

This command has no arguments or keywords.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.
11.1 CA	This command was modified to include an example for the ATM-CES port adapter (PA).
12.0(3)T	This command was modified to include display for ATM bundle maps. An ATM bundle map identifies a bundle and all of its related virtual circuits (VCs).
12.2(2)T, 12.0(21)ST, 12.0(22)S, 12.2(14)S	The display output for this command was modified to include the IPv6 address mappings of remote nodes to ATM permanent virtual circuits (PVCs).

Examples

The following is sample output from the **show atm map** command for a bundle called san-jose (0/122, 0/123, 0/124, and 0/126 are the virtual path and virtual channel identifiers of the bundle members):

```
Router# show atm map

Map list san-jose_B_ATM1/0.52 : PERMANENT
ip 10.1.1.1. maps to bundle san-jose, 0/122, 0/123, 0/124, 0/126, ATM1/0.52, broadcast
```

The following is sample output from the **show atm map** command for an ATM-CES PA on the Cisco 7200 series router:

```
Router# show atm map

Map list alien: PERMANENT
ip 10.1.1.1 maps to VC 6
ip 10.1.1.2 maps to VC 6
```

The following is sample output from the **show atm map** command that displays information for a bundle called new-york:

```
Router# show atm map

Map list atm:
vines 3004B310:0001 maps to VC 4, broadcast
ip 172.21.168.110 maps to VC 1, broadcast
clns 47.0004.0001.0000.0c00.6e26.00 maps to VC 6, broadcast
appletalk 10.1 maps to VC 7, broadcast
```

```
decnet 10.1 maps to VC 2, broadcast
Map list new-york: PERMANENT
ip 10.0.0.2 maps to bundle new-york, 0/200, 0/205, 0/210, ATM1/0.1
```

The following is sample output from the **show atm map** command for a multipoint connection:

```
Router# show atm map

Map list atm_pri: PERMANENT
ip 10.4.4.4 maps to NSAP CD.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12, broadcast,
aal5mux, multipoint connection up, VC 6
ip 10.4.4.6 maps to NSAP DE.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12, broadcast,
aal5mux, connection up, VC 15, multipoint connection up, VC 6

Map list atm_ipx: PERMANENT
ipx 1004.dddd.dddd.dddd maps to NSAP DE.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12,
broadcast, aal5mux, multipoint connection up, VC 8
ipx 1004.cccc.cccc.cccc maps to NSAP CD.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12,
broadcast, aal5mux, multipoint connection up, VC 8

Map list atm_apple: PERMANENT
appletalk 62000.5 maps to NSAP CD.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12,
broadcast, aal5mux, multipoint connection up, VC 4
appletalk 62000.6 maps to NSAP DE.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12,
broadcast, aal5mux, multipoint connection up, VC 4
```

The following is sample output from the **show atm map** command if you configure an ATM PVC using the **pvc** command:

```
Router# show atm map

Map list endA: PERMANENT
ip 10.11.11.1 maps to VC 4, VPI 0, VCI 60, ATM0.2
```

The following sample output from the **show atm map** command shows the link-local and global IPv6 addresses (FE80::60:3E47:AC8:C and 2001:0DB8:2222::72, respectively) of a remote node that are explicitly mapped to PVC 1/32 of ATM interface 0;

```
Router# show atm map

Map list ATM0pvc1 : PERMANENT
ipv6 FE80::60:3E47:AC8:C maps to VC 1, VPI 1, VCI 32, ATM0
        , broadcast
ipv6 2001:0DB8:2222::72 maps to VC 1, VPI 1, VCI 32, ATM0
```

Table 7 describes the significant fields shown in the displays.

Table 7 show atm map Field Descriptions

Field	Description
Map list	Name of map list.
PERMANENT	This map entry was entered from configuration; it was not entered automatically by a process.
ip 172.21.168.110 maps to VC 1 or ip 10.4.4.6 maps to NSAP DE.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12	Name of protocol, the protocol address, and the virtual circuit descriptor (VCD) or network service access point (NSAP) to which the address is mapped (for ATM VCs configured with the **atm pvc** command).
broadcast	Indicates pseudobroadcasting.

Table 7 show atm map Field Descriptions (continued)

Field	Description
ip 10.11.11.1 maps to VC 4, VPI 0, VCI 60, ATM0.2	Name of protocol, the protocol address, the virtual path identifier (VPI) number, the virtual channel identifier (VCI) number, and the ATM interface or subinterface (for ATM PVCs configured using the **pvc** command).
or	or
ip 10.4.4.6 maps to NSAP DE.CDEF.01.234567.890A.BCDE.F012.345 6.7890.1234.12	Name of the protocol, the protocol address, and the NSAP to which the address is mapped (for ATM switched virtual circuits (SVCs) configured using the **svc** command).
aal5mux	Indicates the encapsulation used, a multipoint or point-to-point VC, and the number of the virtual circuit.
multipoint connection up	Indicates that this is a multipoint VC.
VC 6	Number of the VC.
connection up	Indicates a point-to-point VC.
VPI	VPI for the VC.
VCI	VCI for the VC.
ATM1/0.52	ATM interface or subinterface number.
Map list	Name of the bundle whose mapping information follows.
ip 10.1.1.1 maps to bundle san-jose, 0/122, 0/123, 0/124, 0/126	IP address of the bundle and VC members that belong to the bundle.

Related Commands

Command	Description
protocol (ATM)	Configures a static map for an ATM PVC, SVC, VC class, or VC bundle. Enables Inverse ARP or Inverse ARP broadcasts on an ATM PVC by either configuring Inverse ARP directly on the PVC, on the VC bundle, or in a VC class (applies to IP and IPX protocols only).
protocol ipv6 (ATM)	Maps the IPv6 address of a remote node to the ATM PVC used to reach the address.
pvc	Creates or assigns a name to an ATM PVC, specifies the encapsulation type on an ATM PVC, or enters interface-ATM-VC configuration mode.
show atm bundle	Displays the bundle attributes assigned to each bundle VC member and the current working status of the VC members.
show atm bundle statistics	Displays statistics on the specified bundle.
svc	Creates an ATM SVC and specifies destination NSAP address on an interface or subinterface.

show atm pvc dbs

To display all ATM permanent virtual circuits (PVCs) that have Dynamic Subscriber Bandwidth Selection (DBS) quality of service (QoS) parameters applied, use the **show atm pvc dbs** command in privileged EXEC mode.

show atm pvc dbs

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(4)B	This command was introduced.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.

Usage Guidelines

Use the **show atm pvc dbs** command to display information about ATM PVCs that have DBS QoS parameters applied. To view information about all ATM PVCs in your system, use the **show atm pvc** command.

Examples

he following example displays information about ATM PVCs that have DBS QoS parameters applied:

```
Router# show atm pvc dbs

            VCD /                                        Peak  Avg/Min Burst
Interface   Name       VPI   VCI  Type   Encaps   SC    Kbps   Kbps   Cells Sts
1/0.7       3           0    95   PVC    MUX      VBR    2000    700   94  UP
```

Table 8 describes the significant fields shown in the display.

Table 8 show atm pvc dbs Field Descriptions

Field	Description
Interface	Identifies the interface and subinterface and the slot number.
VCD/Name	Identifies the Virtual Connection Descriptor (VCD). The connection name is displayed when a name for the virtual circuit was defined using the **pvc** command.
VPI	Identifies the network virtual path identifier (VPI) name for this PVC.
VCI	Identifies the ATM network virtual channel identifier (VCI) for the PVC.

Table 8 show atm pvc dbs Field Descriptions (continued)

Field	Description
Type	Identifies the type of PVC detected from PVC Discovery. • PVC-D—Indicates a PVC created due to PVC Discovery. • PVC-L—Indicates that the corresponding peer of this PVC could not be found on the switch. • PVC-M—Indicates that some or all of the QoS parameters of this PVC do not match the QoS parameters of the corresponding peer.
Encaps	Identifies the ATM encapsulation type of the VC.
SC	Identifies the service category for the VC.
Peak Kbps	Identifies the number of kilobits per second sent at the peak rate.
Avg/Min Kbps	Identifies the number of kilobits per second sent at the average rate.
Burst Cells	Identifies the burst cell size in terms of number of cells. This number is the maximum number of ATM cells the VC can send at the peak rate.
Sts	Identifies the status of the virtual circuit.

Related Commands

Command	Description
dbs enable	Enables DBS.
pvc	Creates or assigns a name to an ATM PVC, specifies the encapsulation type on an ATM PVC, or enters interface-ATM-VC configuration mode.
pvc-in-range	Configures an individual PVC within a PVC range.
range pvc	Defines a range of ATM PVCs.
show atm pvc	Displays all ATM PVCs and traffic information.
vc-class atm	Configures a VC class for an ATM VC or interface.

show atm pvc

To display all ATM permanent virtual connections (PVCs) and traffic information, use the **show atm pvc** command in privileged EXEC mode.

show atm pvc [*vpi*/*vci* | *name* | **interface atm** *interface-number*[**.***subinterface-number* **multipoint**]] [**ppp**]

Syntax Description

vpi/*vci*	(Optional) ATM virtual path identifier (VPI) and virtual channel identifier (VCI) numbers. The absence of the slash character (**/**) and a *vpi* value causes the *vpi* value to default to 0.
name	(Optional) Name of the PVC.
interface atm *interface-number*	(Optional) Displays all PVCs on the specified ATM interface. To determine the appropriate form of the *interface-number* argument, consult your ATM network module, port adapter, or router documentation.
.*subinterface-number*	(Optional) Subinterface number in the range from 1 to 4294967293. The dot (.) is required as a separator between *interface-number* and *subinterface-number*.
multipoint	(Optional) Multipoint subinterface.
ppp	(Optional) Displays each PVC configured for PPP over ATM.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.3T	This command was introduced.
12.1(1)T	This command was modified to display PPPoE status.
12.2(4)T	This command was modified to display only PVCs that are attached to a virtual access interface. Before this modification, all PVCs that were configured with PPPoA or PPPoE were displayed.
12.0(23)S	This command was modified to display OAM cell emulation status for Any Transport over MPLS (AToM).
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.
12.3(7)T	This command was modified to display information about multilink PPP over ATM link fragmentation and interleaving for ATM PVCs.
12.0(30)S	This command was modified to display information about OAM loopback detection.

Usage Guidelines

If the *vpi*/*vci* or *name* argument is not specified, the output of this command is the same as that of the **show atm vc** command, but only the configured PVCs are displayed.

If the *vpi*/*vci* or *name* argument is specified, the output of this command is the same as that of the **show atm vc** *vcd* command, with extra information related to PVC management, including connection name, detailed states, and Operation, Administration, and Maintenance (OAM) counters.

If the **interface atm** *interface-number* option is included in the command, all PVCs under that interface or subinterface are displayed.

Examples

The following is sample output from the **show atm pvc** command. The output is the same as that of the **show atm vc** command, but only the configured PVCs are displayed.

```
Router# show atm pvc

           VCD/                                      Peak      Avg/Min   Burst
Interface  Name   VPI   VCI   Type   Encaps      Kbps         Kbps   Cells      Sts
2/0        1        0     5    PVC     SAAL    155000       155000               UP
2/0        2        0    16    PVC     ILMI    155000       155000               UP
2/0.2      101      0    50    PVC     SNAP    155000       155000               UP
2/0.2      102      0    60    PVC     SNAP    155000       155000             DOWN
2/0.2      104      0    80    PVC     SNAP    155000       155000               UP
2/0        hello    0    99    PVC     SNAP      1000                            UP
```

The following is sample output from the **show atm pvc** command with the *vpi*/*vci* argument specified:

```
Router# show atm pvc 0/41

ATM2/0: VCD: 3, VPI: 0, VCI: 41
UBR, PeakRate: 155000
AAL5-LLC/SNAP, etype:0x0, Flags: 0xC20, VCmode: 0x0
OAM frequency: 0 second(s), OAM retry frequency: 1 second(s), OAM retry frequency: 1
second(s)
OAM up retry count: 3, OAM down retry count: 5
OAM Loopback status: OAM Disabled
OAM VC state: Not Managed
OAM Loop detection: Disabled
ILMI VC state: Not Managed
InARP frequency: 15 minutes(s)
InPkts: 31759, OutPkts: 26497, InBytes: 2356434, OutBytes: 1589743
InPRoc: 15785, OutPRoc: 26472, Broadcasts: 0
InFast: 20, OutFast: 20, InAS: 15954, OutAS: 6
OAM cells received: 0
F5 InEndloop: 0, F5 InSegloop: 0, F5 InAIS: 0, F5 InRDI: 0
F4 InEndloop: 0, F4 InSegloop: 0, F4 InAIS: 0, F4 InRDI: 0
OAM cells sent: 0
F5 OutEndloop: 0, F5 OutSegloop: 0, F5 OutRDI: 0
F4 OutEndloop: 0, F4 OutSegloop: 0, F4 OutRDI: 0
OAM cell drops: 0
Status: UP
PPPOE enabled.
```

The following sample output from the **show atm pvc** command displays OAM cell emulation statistics, which are marked in this example by exclamation points:

```
Router# show atm pvc 5/500

ATM4/1/0.200: VCD: 6, VPI: 5, VCI: 500
UBR, PeakRate: 1
AAL5-LLC/SNAP, etype:0x0, Flags: 0x34000C20, VCmode: 0x0
OAM Cell Emulation: enabled, F5 End2end AIS Xmit frequency: 1 second(s) !!!
```

```
OAM frequency: 0 second(s), OAM retry frequency: 1 second(s)
OAM up retry count: 3, OAM down retry count: 5
OAM Loopback status: OAM Disabled
OAM VC state: Not ManagedVerified
OAM Loop detection: Disabled
ILMI VC state: Not Managed
InPkts: 564, OutPkts: 560, InBytes: 19792, OutBytes: 19680
InPRoc: 0, OutPRoc: 0
InFast: 4, OutFast: 0, InAS: 560, OutAS: 560
InPktDrops: 0, OutPktDrops: 0
CrcErrors: 0, SarTimeOuts: 0, OverSizedSDUs: 0
Out CLP=1 Pkts: 0
OAM cells received: 26
F5 InEndloop: 0, F5 InSegloop: 0, F5 InAIS: 0, F5 InRDI: 26
OAM cells sent: 77
F5 OutEndloop: 0, F5 OutSegloop: 0, F5 OutAIS: 77, F5 OutRDI: 0  !!!
OAM cell drops: 0
Status: UP
```

The following is sample output from the **show atm pvc** command with the ATM subinterface specified:

```
Router# show atm pvc interface atm 2/0.2

           VCD/                                      Peak       Avg/Min   Burst
Interface  Name   VPI   VCI   Type   Encaps      Kbps          Kbps   Cells       Sts
2/0.2      101     0    50    PVC      SNAP   155000        155000               UP
2/0.2      102     0    60    PVC      SNAP   155000        155000             DOWN
2/0.2      104     0    80    PVC      SNAP   155000        155000               UP
```

The following is sample output for the **show atm pvc** command for a PVC that is a member of a multilink PPP bundle:

```
Router# show atm pvc 15/200

ATM4/0.10000:VCD:16, VPI:15, VCI:200
UBR, PeakRate:149760 (353208 cps)
AAL5-LLC/SNAP, etype:0x0, Flags:0xC20, VCmode:0x0, Encapsize:12
OAM frequency:0 second(s), OAM retry frequency:1 second(s)
OAM up retry count:3, OAM down retry count:5
OAM Loopback status:OAM Disabled
OAM VC State:Not Managed
OAM Loop detection: Disabled
ILMI VC status:Not Managed
VC TxRingLimit:40 particles
VC Rx Limit:800 particles
InARP frequency:15 minutes(s)
Transmit priority 6
InPkts:347, OutPkts:399, InBytes:6268, OutBytes:7728
InCells:347, OutCells:399
InPRoc:7, OutPRoc:228
InFast:338, OutFast:169, InAS:0, OutAS:0
InPktDrops:0, OutPktDrops:0/0/0 (holdq/outputq/total)
InCellDrops:0, OutCellDrops:0
InByteDrops:0, OutByteDrops:0
CrcErrors:0, SarTimeOuts:0, OverSizedSDUs:0, LengthViolation:0, CPIErrors:0
Out CLP=1 Pkts:0, Cells:0
OAM cells received:0
F5 InEndloop:0, F5 InSegloop:0, F5 InAIS:0, F5 InRDI:0
F4 InEndloop:0, F4 InSegloop:0, F4 InAIS:0, F4 InRDI:0
OAM cells sent:0
F5 OutEndloop:0, F5 OutSegloop:0, F5 OutRDI:0
F4 OutEndloop:0, F4 OutSegloop:0, F4 OutRDI:0
OAM cell drops:0
```

```
Status:UP
PPP:Virtual-Access3 from Virtual-Template1
PPPoA Current State = LOCALLY_TERMINATED
PPPoA Latest  Event = Vaccess Up
PPPoA Latest  Error = None
PPPoA Session ID    = 7
PPPoA  Handle = 0x4D000006, SSS Handle = 0x00000000
Switch Handle = 0xB5000006, PPP Handle = 0xD700000A
AAA Unique ID = 0x00000007, AIE Handle = 0xE7000006
PVC belongs to Multilink PPP Bundle Virtual-Access4 as a PPPoA member link
Packets in VC Holdq:0 , Particles in VC Tx Ring:0
```

The following is sample output from the **show atm pvc** command with loopback detection mode through OAM enabled:

```
Router# show atm pvc 4/100

ATM1/0: VCD: 4, VPI: 4, VCI: 100
UBR, PeakRate: 149760
AAL5-LLC/SNAP, etype:0x0, Flags: 0xC20, VCmode: 0x0
!
OAM frequency: 10 second(s), OAM retry frequency: 1 second(s)
OAM up retry count: 3, OAM down retry count: 5
OAM Loopback status: OAM Received
OAM VC state: Verified
OAM Loop detection: Enabled ! Indicates that loopback mode detection is enabled.
!
ILMI VC state: Not Managed
VC is managed by OAM.
InARP frequency: 15 minutes(s)
Transmit priority 4
InPkts: 0, OutPkts: 0, InBytes: 0, OutBytes: 0
InPRoc: 0, OutPRoc: 0, Broadcasts: 0
InFast: 0, OutFast: 0, InAS: 0, OutAS: 0
InPktDrops: 0, OutPktDrops: 0
CrcErrors: 0, SarTimeOuts: 0, OverSizedSDUs: 0
Out CLP=1 Pkts: 0
OAM cells received: 27
F5 InEndloop: 27, F5 InSegloop: 0, F5 InAIS: 0, F5 InRDI: 0
OAM cells sent: 27
F5 OutEndloop: 27, F5 OutSegloop: 0, F5 OutAIS: 0, F5 OutRDI: 0
OAM cell drops: 3
Status: UP
```

The following is sample output from the **show atm pvc** command when loopback mode has been detected:

```
Router# show atm pvc 4/100

ATM1/0: VCD: 4, VPI: 4, VCI: 100
UBR, PeakRate: 149760
AAL5-LLC/SNAP, etype:0x0, Flags: 0xC20, VCmode: 0x0
!
OAM frequency: 10 second(s), OAM retry frequency: 1 second(s)
OAM up retry count: 3, OAM down retry count: 5
OAM Loopback status: OAM Sent
OAM VC state: Not Verified
OAM Loop detection: Enabled, Detected ! Indicates that loopback mode has been detected on
this interface.
!
ILMI VC state: Not Managed
VC is managed by OAM.
InARP frequency: 15 minutes(s)
Transmit priority 4
```

```
InPkts: 0, OutPkts: 0, InBytes: 0, OutBytes: 0
InPRoc: 0, OutPRoc: 0, Broadcasts: 0
InFast: 0, OutFast: 0, InAS: 0, OutAS: 0
InPktDrops: 0, OutPktDrops: 0
CrcErrors: 0, SarTimeOuts: 0, OverSizedSDUs: 0
Out CLP=1 Pkts: 0
OAM cells received: 20
F5 InEndloop: 20, F5 InSegloop: 0, F5 InAIS: 0, F5 InRDI: 0
OAM cells sent: 20
F5 OutEndloop: 20, F5 OutSegloop: 0, F5 OutAIS: 0, F5 OutRDI: 0
OAM cell drops: 1
Status: DOWN, State: NOT_VERIFIED
```

Table 9 describes significant fields shown in the displays.

Table 9 show atm pvc Field Descriptions

Field	Description
Interface	Interface and subinterface slot and port.
VCD/Name	Virtual connection descriptor (virtual connection number). The connection name is displayed if a name for the VC was configured using the **pvc** command.
VPI	Virtual path identifier.
VCI	Virtual channel identifier.
Type	Type of PVC detected from PVC discovery, either PVC-D, PVC-L, or PVC-M: • PVC-D—PVC created as a result of PVC discovery. • PVC-L—The corresponding peer of this PVC could not be found on the switch. • PVC-M—Some or all of the QoS[1] parameters of this PVC fail to match those of the corresponding peer on the switch.
Encaps	Type of ATM adaptation layer (AAL) and encapsulation.
Peak or PeakRate	Kilobits per second sent at the peak rate.
Avg/Min or Average Rate	Kilobits per second sent at the average rate.
Burst Cells	Maximum number of ATM cells that the VC can send at peak rate.
Sts or Status	Status of the VC connection: • UP—The connection is enabled for data traffic. • DOWN—The connection is not ready for data traffic. When the Status field is DOWN, a State field is shown. See a description of the different values for the State field later in this table. • INACTIVE—The interface is down.
Connection Name	Name of the PVC.

Table 9 show atm pvc Field Descriptions (continued)

Field	Description
UBR, UBR+, or VBR–NRT	• UBR—Unspecified bit rate QoS is specified for this PVC. See the **ubr** command for further information. • UBR+—Unspecified bit rate QoS is specified for this PVC. See the **ubr+** command for further information. • VBR–NRT—Variable bit rate–non-real-time QoS rates are specified for this PVC. See the **vbr-nrt** command for further information.
etype	Encapsulation type.
Flags	Bit mask describing VC information. The flag values are summed to result in the displayed value: • 0x40—SVC • 0x20—PVC • 0x10—ACTIVE • 0x0—AAL5-SNAP • 0x1—AAL5-NLPID • 0x2—AAL5-FRNLPID • 0x3—AAL5-MUX • 0x4—AAL3/4-SMDS • 0x5—QSAAL • 0x6—ILMI • 0x7—AAL5-LANE • 0x9—AAL5-CISCOPPP
virtual-access	Virtual-access interface identifier.
virtual-template	Virtual template identifier.
VCmode	AIP-specific or NPM-specific register describing the usage of the VC. This register contains values such as rate queue, peak rate, and AAL mode, which are also displayed in other fields.
OAM Cell emulation	The status of the OAM cell emulation functionality. It is either enabled or disabled.
F5 end2end AIS xmit frequency	Number of seconds between transmission of AIS cells.
OAM frequency	Number of seconds between transmission of OAM loopback cells.
OAM retry frequency	Frequency (in seconds) at which end-to-end F5 loopback cells should be sent when a change in state (up or down) is being verified. For example, if a PVC is up and a loopback cell response is not received after the value of the *frequency* argument (in seconds) specified using the **oam-pvc** command, loopback cells are sent at the value of the *retry-frequency* argument to determine whether the PVC is down.
OAM up retry count	Number of consecutive end-to-end F5 OAM loopback cell responses that must be received in order to change a PVC state to up. Does not apply to SVCs.

Table 9 show atm pvc Field Descriptions (continued)

Field	Description
OAM down retry count	Number of consecutive end-to-end F5 OAM loopback cell responses that are not received in order to change a PVC state to down or tear down an SVC.
OAM Loopback status	Status of end-to-end F5 OAM loopback cell generation for this VC. This field will have one of the following values: • OAM Disabled—End-to-end F5 OAM loopback cell generation is disabled. • OAM Sent—OAM cell was sent. • OAM Received—OAM cell was received. • OAM Failed—OAM reply was not received within the frequency period or contained a bad correlation tag.
OAM VC state	This field will have one of the following states for this VC: • AIS[2]/RDI[3]—The VC received AIS/RDI cells. End-to-end F5 OAM loopback cells are not sent in this state. • Down Retry—An OAM loopback failed. End-to-end F5 OAM loopback cells are sent at retry frequency to verify that the VC is really down. After down-count unsuccessful retries, the VC goes to the Not Verified state. • Not Managed—VC is not being managed by OAM. • Not Verified—VC has not been verified by end-to-end F5 OAM loopback cells. AIS and RDI conditions are cleared. • Up Retry—An OAM loopback was successful. End-to-end F5 OAM loopback cells are sent at retry frequency to verify that the VC is really up. After up-count successive and successful loopback retries, the VC goes to the Verified state. • Verified—Loopbacks are successful. AIS/RDI cell was not received.
OAM Loop detection	Status of loopback detection mode through OAM: • Disabled—Automatic loopback detection is disabled. • Enabled—Automatic loopback detection is enabled. • Detected—Loopback mode is detected on an ATM interface.
ILMI VC state	This field will have one of the following states for this VC: • Not Managed—VC is not being managed by ILMI[4]. • Not Verified—VC has not been verified by ILMI. • Verified—VC has been verified by ILMI.
VC is managed by OAM/ILMI	VC is managed by OAM or ILMI.
InARP frequency	Number of minutes for the Inverse Address Resolution Protocol (ARP) time period.
InPkts	Total number of packets received on this VC. This number includes all fast-switched and process-switched packets.
OutPkts	Total number of packets sent on this VC. This number includes all fast-switched and process-switched packets.

Table 9 show atm pvc Field Descriptions (continued)

Field	Description
InBytes	Total number of bytes received on this VC. This number includes all fast-switched and process-switched bytes.
OutBytes	Total number of bytes sent on this VC. This number includes all fast-switched and process-switched bytes.
InPRoc	Number of process-switched input packets.
OutPRoc	Number of process-switched output packets.
Broadcasts	Number of process-switched broadcast packets.
InFast	Number of fast-switched input packets.
OutFast	Number of fast-switched output packets.
InAS	Number of autonomous-switched or silicon-switched input packets.
OutAS	Number of autonomous-switched or silicon-switched output packets.
OAM cells received	Total number of OAM cells received on this VC.
F5 InEndloop	Number of end-to-end F5 OAM loopback cells received.
F5 InSegloop	Number of segment F5 OAM loopback cells received.
F5 InAIS	Number of F5 OAM AIS cells received.
F5 InRDI	Number of F5 OAM RDI cells received.
F4 InEndloop	Number of end-to-end F4 OAM loopback cells received.
F4 InSegloop	Number of segment F4 OAM loopback cells received.
F4 InAIS	Number of F4 OAM AIS cells received.
F4 InRDI	Number of F4 OAM RDI cells received.
OAM cells sent	Total number of OAM cells sent on this VC.
F5 OutEndloop	Number of end-to-end F5 OAM loopback cells sent.
F5 OutSegloop	Number of segment F5 OAM loopback cells sent.
F5 OutRDI	Number of F5 OAM RDI cells sent.
OAM cell drops	Number of OAM cells dropped (or flushed).

Table 9 show atm pvc Field Descriptions (continued)

Field	Description
PVC Discovery	• NOT_VERIFIED—This PVC is manually configured on the router and not yet verified with the attached adjacent switch. • WELL_KNOWN—This PVC has a VCI value of 0 through 31. • DISCOVERED—This PVC is learned from the attached adjacent switch via ILMI. • MIXED—Some of the traffic parameters for this PVC were learned from the switch via ILMI. • MATCHED—This PVC is manually configured on the router, and the local traffic-shaping parameters match the parameters learned from the switch. • MISMATCHED—This PVC is manually configured on the router, and the local traffic-shaping parameters do not match the parameters learned from the switch. • LOCAL_ONLY—This PVC is configured locally on the router and not on the remote switch.
Status	When the Status field indicates UP, the VC is established. When the Status field indicates DOWN, refer to the State field for further information about the VC state.
State	When the Status field is UP, this field does not appear. When the Status field is DOWN or INACTIVE, the State field will appear with one of the following values: • NOT_VERIFIED—The VC has been established successfully; waiting for OAM (if enabled) and ILMI (if enabled) to verify that the VC is up. • NOT_EXIST—VC has not been created. • HASHING_IN—VC has been hashed into a hash table. • ESTABLISHING—Ready to establish VC connection. • MODIFYING—VC parameters have been modified. • DELETING—VC is being deleted. • DELETED—VC has been deleted. • NOT_IN_SERVICE—ATM interface is shut down.
PPP	For PPP over ATM, indicates the virtual access interface number and virtual template number being used.
PPPoA Current State	State of the PPPoA session associated with the VC.
PPPoA Latest Event	The latest event that occurred on the PPPoA session associated with the VC.
PPPoA Latest Error	The latest error that occurred on the PPPoA session associated with the VC.
PPPoA Session ID	PPPoA session identifier of the PPPoA session associated with the VC.
PPPoA Handle	PPPoA context handle.
SSS Handle	SSS handle for PPPoA session associated with the VC.
Switch Handle	SSS handle for switch management.
PPP Handle	Handle associated with the PPP context.

Table 9 show atm pvc Field Descriptions (continued)

Field	Description
AAA Unique ID	Unique identifier associated with the AAA session.
AIE Handle	Access IE handle for the PPPoA session.
Packets in VC Holdq	Number of packets in the hold queue of the VC.
Particles in VC Tx Ring	Number of particles in the Tx ring of the VC.

1. QoS = quality of service
2. AIS = alarm indication signal
3. RDI = remote defect identification
4. ILMI = Interim Local Management Interface

show atm svc

To display all ATM switched virtual circuits (SVCs) and traffic information, use the **show atm svc** command in privileged EXEC mode.

show atm svc [*vpi*/*vci* | *name* | **interface atm** *interface-number*]

Syntax Description

vpi/*vci*	(Optional) The ATM VPI and VCI numbers. The absence of the slash character (/) and a *vpi* value causes the *vpi* value to default to 0.
name	(Optional) Name of the SVC.
interface atm *interface-number*	(Optional) Interface number or subinterface number of the SVC. Displays all SVCs on the specified interface or subinterface. The *interface-number* argument uses one of the following formats, depending on what router platform you are using: • For the AIP on Cisco 7500 series routers; For the ATM port adapter, ATM-CES port adapter, and enhanced ATM port adapter on Cisco 7200 series routers; For the 1-port ATM-25 network module on Cisco 2600 and 3600 series routers: *slot*/**0**[**.***subinterface-number* **multipoint**] • For the ATM port adapter and enhanced ATM port adapter on Cisco 7500 series routers: *slot*/*port-adapter*/**0**[**.***subinterface-number* **multipoint**] • For the NPM on Cisco 4500 and 4700 routers: *number*[**.***subinterface-number* **multipoint**] For a description of these arguments, refer to the **interface atm** command.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.3	This command was introduced.

Usage Guidelines

If the *vpi*/*vci* or *name* argument is not specified, the output of this command is the same as that of the **show atm vc** command but only the configured SVCs are displayed. See the first sample output below, which uses the **show atm svc** command without any of the optional arguments.

If the *vpi*/*vci* or *name* argument is specified, the output of this command is the same as the **show atm vc** *vcd* command, plus extra information related to SVC management including connection name, detailed states, and OAM counters. See the second sample output below, which uses the s**how atm svc** command with the *vpi/vci* specified as 0/34.

If the **interface atm** *interface-number* option is included in the command, all SVCs under that interface or subinterface are displayed. See the third sample output below, which uses the **show atm svc** command with the ATM subinterface specified as 2/0.2.

Examples

The following is sample output from the **show atm svc** command:

```
Router# show atm svc

           VCD/                                      Peak      Avg/Min   Burst
Interface  Name   VPI   VCI   Type   Encaps     Kbps         Kbps   Cells       Sts
2/0.2        4     0    32    SVC      SNAP   155000       155000                UP
2/0.2        3     0    33    SVC      SNAP   155000       155000                UP
2/0.1        5     0    34    SVC      SNAP   155000                             UP
2/0.2        6     0    35    SVC      SNAP   155000       155000                UP
```

The following is sample output from the **show atm svc** command with VPI 0 and VCI 34 specified:

```
Router# show atm svc 0/34

ATM2/0.1: VCD: 5, VPI: 0, VCI: 34
UBR, PeakRate: 155000
AAL5-LLC/SNAP, etype: 0x0, Flags 0x440, VCmode: 0xE000
OAM frequency: 0 second(s), OAM retry frequency: 1 second(s)
OAM up retry count: 3, OAM down retry count: 5
OAM Loopback status: OAM Disabled
OAM VC state: Not Managed
ILMI VC state: Not Managed
InARP DISABLED
InPkts: 4, OutPkts: 4, InBytes: 432, OutBytes: 432
InPRoc: 4, OutPRoc: 4, Broadcasts: 0
InFast: 0, OutFast: 0, InAS: 0, OutAS: 0
OAM cells received: 0
F5 InEndloop: 0, F5 InSegloop: 0, F5 InAIS: 0, F5 InRDI:0
F4 InEndloop: 0, F4 InSegloop: 0, F4 InAIS: 0, F4 InRDI:0
OAM cells sent: 0
F5 OutEndloop: 0, F5 OutSegloop: 0, F5 OutRDI: 0
OAM cell drops: 0
Status: UP
TTL: 3
interface = ATM2/0.2, call locally initiated, call reference = 8388610
vcnum = 5, vpi = 0, vci = 34, state = Active(U10), point-to-point call
Retry count: Current = 0
timer currently inactive, timer value = 00:00:00
Remote Atm Nsap address:47.00918100000000400B0A2501.0060837B4743.00, VCowner:Static Map
```

The following is sample output from the **show atm svc interface atm** *interface-number* command:

```
Router# show atm svc interface atm 2/0.2

           VCD/                                      Peak      Avg/Min   Burst
Interface  Name   VPI   VCI   Type   Encaps     Kbps         Kbps   Cells       Sts
2/0.2        4     0    32    SVC      SNAP   155000       155000                UP
2/0.2        3     0    33    SVC      SNAP   155000       155000                UP
2/0.2        6     0    35    SVC      SNAP   155000       155000                UP
```

Table 10 describes significant fields shown in the displays.

Table 10 show atm svc Field Descriptions

Field	Description
Interface	Interface and subinterface slot and port.
VCD/Name	Virtual circuit descriptor (virtual circuit number). The connection name is displayed if a name for the VC was configured using the **svc** command.
VPI	Virtual path identifier.
VCI	Virtual channel identifier.
Type	Type of virtual circuit, either SVC or MSVC (multipoint SVC). • MSVC (with no -*x*) indicates that VCD is a leaf of some other router's multipoint VC. • MSVC-*x* indicates there are *x* leaf routers for that multipoint VC opened by the root.
Encaps	Type of ATM adaptation layer (AAL) and encapsulation.
Peak or PeakRate	Kilobits per second transmitted at the peak rate.
Avg/Min or Average Rate	Kilobits per second transmitted at the average rate.
Burst Cells	Value that equals the maximum number of ATM cells the virtual circuit can transmit at peak rate.
Sts or Status	Status of the VC connection. • UP indicates that the connection is enabled for data traffic. • DOWN indicates that the connection is not ready for data traffic. When the Status field is DOWN, a State field is shown. See a description of the different values for this field listed later in this table. • INACTIVE indicates that the interface is down.
Connection Name	The name of the SVC.
UBR, UBR+, or VBR–NRT	UBR—Unspecified Bit Rate QoS is specified for this SVC. See the **ubr** command for further information. UBR+—Unspecified Bit Rate QoS is specified for this SVC. See the **ubr+** command for further information. VBR–NRT—Variable Bit Rate–Non Real Time QoS rates are specified for this SVC. See the **vbr-nrt** command for further information.
etype	Encapsulation type.

Table 10 show atm svc Field Descriptions (continued)

Field	Description
Flags	Bit mask describing virtual circuit information. The flag values are summed to result in the displayed value. 0x40—SVC 0x20—PVC 0x10—ACTIVE 0x0—AAL5-SNAP 0x1—AAL5-NLPID 0x2—AAL5-FRNLPID 0x3—AAL5-MUX 0x4—AAL3/4-SMDS 0x5—QSAAL 0x6—ILMI 0x7—AAL5-LANE 0x9—AAL5-CISCOPPP
VCmode	AIP-specific or NPM-specific register describing the usage of the virtual circuit. This register contains values such as rate queue, peak rate, and AAL mode, which are also displayed in other fields.
OAM frequency	Number of seconds between sending OAM loopback cells.
OAM retry frequency	The frequency (in seconds) that end-to-end F5 loopback cells should be transmitted when a change in UP/DOWN state is being verified. For example, if an SVC is up and a loopback cell response is not received after the *frequency* (in seconds) specified using the **oam-svc** command, then loopback cells are sent at the *retry-frequency* to verify whether the SVC is down.
OAM up retry count	Number of consecutive end-to-end F5 OAM loopback cell responses that must be received in order to change a PVC state to up. Does not apply to SVCs.
OAM down retry count	Number of consecutive end-to-end F5 OAM loopback cell responses that are not received in order to change a PVC state to down or tear down an SVC.
OAM Loopback status	Status of end-to-end F5 OAM loopback cell generation for this VC. This field will have one of the following values: • OAM Disabled—End-to-End F5 OAM loopback cell generation is disabled. • OAM Sent—OAM cell was sent. • OAM Received—OAM cell was received. • OAM Failed—OAM reply was not received within the frequency period or contained bad correlation tag.ssss.

Table 10 show atm svc Field Descriptions (continued)

Field	Description
OAM VC state	This field will have one of the following states for this VC: • AIS/RDI—The VC received AIS/RDI cells. End-to-end F5 OAM loopback cells are not sent in this state. • Down Retry—An OAM loopback failed. End-to-end F5 OAM loopback cells are sent at retry frequency to verify the VC is really down. After down-count unsuccessful retries, the VC goes to the Not Verified state. • Not Managed—VC is not being managed by OAM. • Not Verified—VC has not been verified by end-to-end F5 OAM loopback cells. AIS and RDI conditions are cleared. • Up Retry—An OAM loopback was successful. End-to-end F5 OAM loopback cells are sent at retry frequency to verify the VC is really up. After up-count successive and successful loopback retries, the VC goes to the Verified state. • Verified—Loopbacks are successful. AIS/RDI cell was not received.
ILMI VC state	This field will have one of the following states for this VC: • Not Managed—VC is not being managed by ILMI. • Not Verified—VC has not been verified by ILMI. • Verified—VC has been verified by ILMI.
VC is managed by OAM/ILMI	VC is managed by OAM and/or ILMI.
InARP frequency	Number of minutes for the Inverse ARP time period.
InPkts	Total number of packets received on this virtual circuit. This number includes all fast-switched and process-switched packets.
OutPkts	Total number of packets sent on this virtual circuit. This number includes all fast-switched and process-switched packets.
InBytes	Total number of bytes received on this virtual circuit. This number includes all fast-switched and process-switched bytes.
OutBytes	Total number of bytes sent on this virtual circuit. This number includes all fast-switched and process-switched bytes.
InPRoc	Number of process-switched input packets.
OutPRoc	Number of process-switched output packets.
Broadcasts	Number of process-switched broadcast packets.
InFast	Number of fast-switched input packets.
OutFast	Number of fast-switched output packets.
InAS	Number of autonomous-switched or silicon-switched input packets.
OutAS	Number of autonomous-switched or silicon-switched output packets.
OAM cells received	Total number of OAM cells received on this virtual circuit.
F5 InEndloop	Number of end-to-end F5 OAM loopback cells received.
F5 InSegloop	Number of segment F5 OAM loopback cells received.

Table 10 show atm svc Field Descriptions (continued)

Field	Description
F5 InAIS	Number of F5 OAM AIS cells received.
F5 InRDI	Number of F5 OAM RDI cells received.
F4 InEndloop	Number of end-to-end F4 OAM loopback cells received.
F4 InSegloop	Number of segment F4 OAM loopback cells received.
F4 InAIS	Number of F4 OAM AIS cells received.
F4 InRDI	Number of F4 OAM RDI cells received.
OAM cells sent	Total number of OAM cells sent on this virtual circuit.
F5 OutEndloop	Number of end-to-end F5 OAM loopback cells sent.
F5 OutSegloop	Number of segment F5 OAM loopback cells sent.
F5 OutRDI	Number of F5 OAM RDI cells sent.
OAM cell drops	Number of OAM cells dropped (or flushed).
State	When the Status field is DOWN or INACTIVE, the State field will appear with one of the following values: NOT_VERIFIED—The VC has been established successfully; Waiting for OAM (if enabled) and ILMI (if enabled) to verify that the VC is up. NOT_EXIST—VC has not been created. HASHING_IN—VC has been hashed into a hash table. ESTABLISHING—Ready to establish VC connection. MODIFYING—VC parameters have been modified. DELETING—VC is being deleted. DELETED—VC has been deleted. NOT_IN_SERVICE—ATM interface is shut down.
TTL	Time-to-live in ATM hops across the VC.
VC owner	IP Multicast address of group.

show atm traffic

To display current, global ATM traffic information to and from all ATM networks connected to the router, use the **show atm traffic** command in privileged EXEC mode.

show atm traffic

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.

Examples

The following is sample output from the **show atm traffic** command for the ATM-CES port adapter on a Cisco 7200 series router:

```
Router# show atm traffic

0 Input packets
1044 Output packets
1021 Broadcast packets
0 Packets received on non-existent VC
0 Packets attempted to send on non-existent VC
0 OAM cells received
0 OAM cells sent
```

The following is sample output from the **show atm traffic** command for the AIP on a Cisco 7500 series router:

```
Router# show atm traffic

276875 Input packets
272965 Output packets
2 Broadcast packets
0 Packets received on non-existent VC
6 Packets attempted to send on non-existent VC
272523 OAM cells received
F5 InEndloop: 272523, F5 InSegloop: 0, F5 InAIS: 0, F5 InRDI: 0
F4 InEndloop: 0, F4 InSegloop: 0, F4 InAIS: 0, F4 InRDI: 0
272963 OAM cells sent
F5 OutEndloop: 272963, F5 OutSegloop: 0, F5 OutRDI: 0
0 OAM cell drops
```

Table 11 describes the fields shown in the display.

Table 11 show atm traffic Field Descriptions

Field	Description
Input packets	Total packets input.
Output packets	Total packets output.
Broadcast packets	Total broadcast packets output.
Packets received on nonexistent VC	Number of packets sent to virtual circuits not configured.
Packets attempted to send on non-existent VC	Number of packets attempted to be sent on a virtual circuit that were not configured.
OAM cells received	Total Operation, Administration, and Maintenance (OAM) cells received.
F5 InEndloop	Number of end-to-end F5 OAM loopback cells received.
F5 InSegloop	Number of segment F5 OAM loopback cells received.
F5 InAIS	Number of F5 OAM AIS cells received.
F5 InRDI	Number of F5 OAM RDI cells received.
F4 InEndloop	Number of end-to-end F4 OAM loopback cells received.
F4 InSegloop	Number of segment F4 OAM loopback cells received.
F4 InAIS	Number of F4 OAM AIS cells received.
F4 InRDI	Number of F4 OAM RDI cells received.
OAM cells sent	Total number of OAM cells sent on this VC.
F5 OutEndloop	Number of end-to-end F5 OAM loopback cells sent.
F5OutSegloop	Number of segment F5 OAM loopback cells sent.
F5 OutRDI	Number of F5 OAM RDI cells sent.
OAM cell drops	Number of OAM cells dropped (or flushed).

Related Commands

Command	Description
pvc	Configures the PVC interface.
svc	Creates an ATM SVC and specifies the destination NSAP address on a main interface or subinterface.

show atm vc

To display all ATM permanent virtual circuits (PVCs) and switched virtual circuits (SVCs) and traffic information, use the **show atm vc** command in privileged EXEC mode.

show atm vc [*vcd* | **interface** *interface-number*]

Syntax Description

vcd	(Optional) Specifies the virtual circuit descriptor (VCD) about which to display information.
interface *interface-number*	(Optional) Interface number or subinterface number of the PVC or SVC. Displays all PVCs and SVCs on the specified interface or subinterface. The *interface-number* uses one of the following formats, depending on what router platform you are using: • For the ATM Interface Processor (AIP) on Cisco 7500 series routers; for the ATM port adapter, ATM-CES port adapter, and enhanced ATM port adapter on Cisco 7200 series routers; for the 1-port ATM-25 network module on Cisco 2600 and 3600 series routers: *slot*/**0**[**.***subinterface-number* **multipoint**] • For the ATM port adapter and enhanced ATM port adapter on Cisco 7500 series routers: *slot*/*port-adapter*/**0**[**.***subinterface-number* **multipoint**] • For the network processing module (NPM) on Cisco 4500 and Cisco 4700 routers: *number*[**.***subinterface-number* **multipoint**] For a description of these arguments, refer to the **interface atm** command.

Command Modes

Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.
11.1CA	Information about VCs on an ATM-CES port adapter was added to the command output.
12.0(5)T	Information about VCs on an extended Multiprotocol Label Switching (MPLS) ATM interface was added to the command output.
12.2(25)S	Information about packet drops and errors was added to the command output.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB and implemented on the Cisco 10000 series routers.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.

Usage Guidelines

If no value is specified for the *vcd* argument, the command displays information for all PVCs and SVCs. The output is in summary form (one line per virtual circuit).

VCs on the extended MPLS ATM interfaces do not appear in the **show atm vc** command output. Instead, the **show xtagatm vc** command provides a similar output that shows information only on extended MPLS ATM VCs.

Examples

The following is sample output from the **show atm vc** command when no *vcd* value is specified. The status field is either ACTIVE or INACTIVE.

```
Router# show atm vc

Interface     VCD   VPI   VCI Type  AAL/Encaps     Peak   Avg.  Burst Status
ATM2/0          1     0     5  PVC  AAL5-SAAL     155000 155000    93 ACTIVE
ATM2/0.4        3     0    32  SVC  AAL5-SNAP     155000 155000    93 ACTIVE
ATM2/0.65432   10    10    10  PVC  AAL5-SNAP     100000  40000    10 ACTIVE
ATM2/0         99     0    16  PVC  AAL5-ILMI     155000 155000    93 ACTIVE
ATM2/0.105    250    33    44  PVC  AAL5-SNAP     155000 155000    93 ACTIVE
ATM2/0.100    300    22    33  PVC  AAL5-SNAP     155000 155000    93 ACTIVE
ATM2/0.12345 2047   255 65535  PVC  AAL5-SNAP         56     28  2047 ACTIVE
```

The following is sample output from the **show atm vc** command when a *vcd* value is specified for a circuit emulation service (CES) circuit:

```
Router# show atm vc 2

ATM6/0: VCD: 2, VPI: 10, VCI: 10
PeakRate: 2310, Average Rate: 2310, Burst Cells: 94
CES-AAL1, etype:0x0, Flags: 0x20138, VCmode: 0x0
OAM DISABLED
InARP DISABLED
OAM cells received: 0
OAM cells sent: 334272
Status: ACTIVE
```

The following is sample output from the **show atm vc** command when a *vcd* value is specified, displaying statistics for that virtual circuit only:

```
Router# show atm vc 8

ATM4/0: VCD: 8, VPI: 8, VCI: 8
PeakRate: 155000, Average Rate: 155000, Burst Cells: 0
AAL5-LLC/SNAP, etype:0x0, Flags: 0x30, VCmode: 0xE000
OAM frequency: 0 second(s)
InARP frequency: 1 minute(s)
InPkts: 181061, OutPkts: 570499, InBytes: 757314267, OutBytes: 2137187609
InPRoc: 181011, OutPRoc: 10, Broadcasts: 570459
InFast: 39, OutFast: 36, InAS: 11, OutAS: 6
OAM cells received: 0
OAM cells sent: 0
Status: UP
```

The following is sample output from the **show atm vc** command when a *vcd* value is specified, AAL3/4 is enabled, an ATM Switched Multimegabit Data Service (SMDS) subinterface has been defined, and a range of message identifier numbers (MIDs) has been assigned to the PVC:

```
Router# show atm vc 1

ATM4/0.1: VCD: 1, VPI: 0, VCI: 1
PeakRate: 0, Average Rate: 0, Burst Cells: 0
AAL3/4-SMDS, etype:0x1, Flags: 0x35, VCmode: 0xE200
MID start: 1, MID end: 16
InPkts: 0, OutPkts: 0, InBytes: 0, OutBytes: 0
InPRoc: 0, OutPRoc: 0, Broadcasts: 0
```

```
InFast: 0, OutFast: 0, InAS: 0, OutAS: 0
```

The following is sample output from the **show atm vc** command when a *vcd* value is specified and generation of Operation, Administration, and Maintenance (OAM) F5 loopback cells has been enabled:

```
Router# show atm vc 7

ATM4/0: VCD: 7, VPI: 7, VCI: 7
PeakRate: 0, Average Rate: 0, Burst Cells: 0
AAL5-LLC/SNAP, etype:0x0, Flags: 0x30, VCmode: 0xE000
OAM frequency: 10 second(s)
InARP DISABLED
InPkts: 0, OutPkts: 0, InBytes: 0, OutBytes: 0
InPRoc: 0, OutPRoc: 0, Broadcasts: 0
InFast:0, OutFast:0, InAS:0, OutAS:0
OAM cells received: 0
OAM cells sent: 1
Status: UP
```

The following is sample output from the **show atm vc** command when a *vcd* value is specified, and there is an incoming multipoint virtual circuit:

```
Router# show atm vc 3

ATM2/0: VCD: 3, VPI: 0, VCI: 33
PeakRate: 0, Average Rate: 0, Burst Cells: 0
AAL5-MUX, etype:0x809B, Flags: 0x53, VCmode: 0xE000
OAM DISABLED
InARP DISABLED
InPkts: 6646, OutPkts: 0, InBytes: 153078, OutBytes: 0
InPRoc: 6646, OutPRoc: 0, Broadcasts: 0
InFast: 0, OutFast: 0, InAS: 0, OutAS: 0
interface =  ATM2/0, call remotely initiated, call reference = 18082
vcnum = 3, vpi = 0, vci = 33, state = Active
 aal5mux vc, multipoint call
Retry count: Current = 0, Max = 10
timer currently inactive, timer value = never
Root Atm Nsap address: DE.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12
```

The following is sample output from the **show atm vc** command when a *vcd* value is specified, and there is an outgoing multipoint virtual circuit:

```
Router# show atm vc 6

ATM2/0: VCD: 6, VPI: 0, VCI: 35
PeakRate: 0, Average Rate: 0, Burst Cells: 0
AAL5-MUX, etype:0x800, Flags: 0x53, VCmode: 0xE000
OAM DISABLED
InARP DISABLED
InPkts: 0, OutPkts: 818, InBytes: 0, OutBytes: 37628
InPRoc: 0, OutPRoc: 0, Broadcasts: 818
InFast: 0, OutFast: 0, InAS: 0, OutAS: 0
interface =  ATM2/0, call locally initiated, call reference = 3
vcnum = 6, vpi = 0, vci = 35, state = Active
 aal5mux vc, multipoint call
Retry count: Current = 0, Max = 10
timer currently inactive, timer value = never
Leaf Atm Nsap address: DE.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12
Leaf Atm Nsap address: CD.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12
```

The following is sample output from the **show atm vc** command when a *vcd* value is specified and there is a PPP-over-ATM connection:

```
Router# show atm vc 1

ATM8/0.1: VCD: 1, VPI: 41, VCI: 41
PeakRate: 155000, Average Rate: 155000, Burst Cells: 96
AAL5-CISCOPPP, etype:0x9, Flags: 0xC38, VCmode: 0xE000
virtual-access: 1, virtual-template: 1
OAM DISABLED
InARP DISABLED
InPkts: 13, OutPkts: 10, InBytes: 198, OutBytes: 156
InPRoc: 13, OutPRoc: 10, Broadcasts: 0
InFast: 0, OutFast: 0, InAS: 0, OutAS: 0
OAM cells received: 0
OAM cells sent: 0
```

The following is sample output from the **show atm vc** command for IP multicast virtual circuits. The display shows the leaf count for multipoint VCs opened by the root. VCD 3 is a root of a multipoint VC with three leaf routers. VCD 4 is a leaf of some other router's multipoint VC. VCD 12 is a root of a multipoint VC with only one leaf router.

```
Router# show atm vc

           VCD/                                    Peak     Avg/Min     Burst
Interface  Name  VPI   VCI    Type     Encaps       Kbps      Kbps      Cells         Sts
0/0        1       0     5     PVC      SAAL      155000    155000       96          UP
0/0        2       0    16     PVC      ILMI      155000    155000       96          UP
0/0        3       0   124 MSVC-3      SNAP      155000    155000       96          UP
0/0        4       0   125   MSVC      SNAP      155000    155000       96          UP
0/0        5       0   126   MSVC      SNAP      155000    155000       96          UP
0/0        6       0   127   MSVC      SNAP      155000    155000       96          UP
0/0        9       0   130   MSVC      SNAP      155000    155000       96          UP
0/0        10      0   131    SVC      SNAP      155000    155000       96          UP
0/0        11      0   132 MSVC-3      SNAP      155000    155000       96          UP
0/0        12      0   133 MSVC-1      SNAP      155000    155000       96          UP
0/0        13      0   134    SVC      SNAP      155000    155000       96          UP
0/0        14      0   135 MSVC-2      SNAP      155000    155000       96          UP
0/0        15      0   136 MSVC-2      SNAP      155000    155000       96          UP
```

The following is sample output from the **show atm vc** command for an IP multicast virtual circuit. The display shows the owner of the VC and leaves of the multipoint VC. This VC was opened by IP multicast. The three leaf routers' ATM addresses are included in the display. The VC is associated with IP group address 10.1.1.1.

```
Router# show atm vc 11

ATM0/0: VCD: 11, VPI: 0, VCI: 132
PeakRate: 155000, Average Rate: 155000, Burst Cells: 96
AAL5-LLC/SNAP, etype:0x0, Flags: 0x650, VCmode: 0xE000
OAM DISABLED
InARP DISABLED
InPkts: 0, OutPkts: 12, InBytes: 0, OutBytes: 496
InPRoc: 0, OutPRoc: 0, Broadcasts: 12
InFast: 0, OutFast: 0, InAS: 0, OutAS: 0
OAM cells received: 0
OAM cells sent: 0
Status: ACTIVE, TTL: 2, VC owner: IP Multicast (10.1.1.1)
interface =  ATM0/0, call locally initiated, call reference = 2
vcnum = 11, vpi = 0, vci = 132, state = Active
 aal5snap vc, multipoint call
Retry count: Current = 0, Max = 10
timer currently inactive, timer value = 00:00:00
```

```
Leaf Atm Nsap address: 47.0091810000000002BA08E101.444444444444.02
Leaf Atm Nsap address: 47.0091810000000002BA08E101.333333333333.02
Leaf Atm Nsap address: 47.0091810000000002BA08E101.222222222222.02
```

The following is sample output from the **show atm vc** command where no VCD is specified and private VCs are present:

```
Router# show atm vc

AAL /          Peak    Avg.  Burst
Interface      VCD   VPI    VCI Type  Encapsulation  Kbps    Kbps  Cells Status
ATM1/0           1     0     40  PVC  AAL5-SNAP          0       0      0 ACTIVE
ATM1/0           2     0     41  PVC  AAL5-SNAP          0       0      0 ACTIVE
ATM1/0           3     0     42  PVC  AAL5-SNAP          0       0      0 ACTIVE
ATM1/0           4     0     43  PVC  AAL5-SNAP          0       0      0 ACTIVE
ATM1/0           5     0     44  PVC  AAL5-SNAP          0       0      0 ACTIVE
ATM1/0          15     1     32  PVC  AAL5-XTAGATM       0       0      0 ACTIVE
ATM1/0          17     1     34  TVC  AAL5-XTAGATM       0       0      0 ACTIVE
ATM1/0          26     1     43  TVC  AAL5-XTAGATM       0       0      0 ACTIVE
ATM1/0          28     1     45  TVC  AAL5-XTAGATM       0       0      0 ACTIVE
ATM1/0          29     1     46  TVC  AAL5-XTAGATM       0       0      0 ACTIVE
ATM1/0          33     1     50  TVC  AAL5-XTAGATM       0       0      0 ACTIVE
```

When you specify a VCD value and the VCD corresponds to that of a private VC on a control interface, the display output appears as follows:

```
Router# show atm vc 15

ATM1/0 33      1    50  TVC  AAL5-XTAGATM       0       0      0 ACTIVE
ATM1/0: VCD: 15, VPI: 1, VCI: 32, etype:0x8, AAL5 - XTAGATM, Flags: 0xD38
PeakRate: 0, Average Rate: 0, Burst Cells: 0, VCmode: 0x0
XTagATM1, VCD: 1, VPI: 0, VCI: 32
OAM DISABLED, InARP DISABLED
InPkts: 38811, OutPkts: 38813, InBytes: 2911240, OutBytes: 2968834
InPRoc: 0, OutPRoc: 0, Broadcasts: 0
InFast: 0, OutFast: 0, InAS: 0, OutAS: 0
OAM F5 cells sent: 0, OAM cells received: 0
Status: ACTIVE
```

Table 12 describes the fields shown in the displays.

Table 12 show atm vc Field Descriptions

Field	Description
Interface	Interface slot and port.
VCD/Name	Virtual circuit descriptor (virtual circuit number). The connection name is displayed if the virtual circuit (VC) was configured using the **pvc** command and the name was specified.
VPI	Virtual path identifier.
VCI	Virtual channel identifier.

Table 12 show atm vc Field Descriptions (continued)

Field	Description
Type	Type of VC, either PVC, SVC, TVC, or multipoint SVC (MSVC). • MSVC (with no -*x*) indicates that VCD is a leaf of some other router's multipoint VC. • MSVC-*x* indicates there are *x* leaf routers for that multipoint VC opened by the root. Type of PVC detected from PVC discovery, either PVC-D, PVC-L, or PVC-M. • PVC-D indicates a PVC created due to PVC discovery. • PVC-L indicates that the corresponding peer of this PVC could not be found on the switch. • PVC-M indicates that some or all of the Quality of Service (QoS) parameters of this PVC do not match those of the corresponding peer on the switch. • TVC indicates a Tag VC.
Encaps	Type of ATM adaptation layer (AAL) and encapsulation.
PeakRate	Kilobits per second sent at the peak rate.
Average Rate	Kilobits per second sent at the average rate.
Burst Cells	Value that equals the maximum number of ATM cells the VC can send at peak rate.
Status	Status of the VC connection. • UP indicates that the connection is enabled for data traffic. • DOWN indicates that the connection is not ready for data traffic. When the Status field is DOWN, a State field is shown. • INACTIVE indicates that the interface is down. • ACTIVE indicates that the interface is in use and active.
etype	Encapsulation type.

Table 12 show atm vc Field Descriptions (continued)

Field	Description
Flags	Bit mask describing VC information. The flag values are summed to result in the displayed value. 0x10000 ABR VC 0x20000 CES VC 0x40000 TVC 0x100 TEMP (automatically created) 0x200 MULTIPOINT 0x400 DEFAULT_RATE 0x800 DEFAULT_BURST 0x10 ACTIVE 0x20 PVC 0x40 SVC 0x0 AAL5-SNAP 0x1 AAL5-NLPID 0x2 AAL5-FRNLPID 0x3 AAL5-MUX 0x4 AAL3/4-SMDS 0x5 QSAAL 0x6 AAL5-ILMI 0x7 AAL5-LANE 0x8 AAL5-XTAGATM 0x9 CES-AAL1 0xA F4-OAM
VCmode	AIP-specific or NPM-specific register describing the usage of the VC. This register contains values such as rate queue, peak rate, and AAL mode, which are also displayed in other fields.
OAM frequency	Seconds between OAM loopback messages, or DISABLED if OAM is not in use on this VC.
InARP frequency	Minutes between Inverse Address Resolution Protocol (InARP) messages, or DISABLED if InARP is not in use on this VC.
virtual-access	Virtual access interface identifier.
virtual-template	Virtual template identifier.
InPkts	Total number of packets received on this VC. This number includes all fast-switched and process-switched packets.
OutPkts	Total number of packets sent on this VC. This number includes all fast-switched and process-switched packets.
InBytes	Total number of bytes received on this VC. This number includes all fast-switched and process-switched packets.
OutBytes	Total number of bytes sent on this VC. This number includes all fast-switched and process-switched packets.
InPRoc	Number of process-switched input packets.
OutPRoc	Number of process-switched output packets.
Broadcasts	Number of process-switched broadcast packets.
InFast	Number of fast-switched input packets.

Table 12 show atm vc Field Descriptions (continued)

Field	Description
OutFast	Number of fast-switched output packets.
InAS	Number of autonomous-switched or silicon-switched input packets.
VC TxRingLimit	Transmit Ring Limit for this VC.
VC Rx Limit	Receive Ring Limit for this VC.
Transmit priority	ATM service class transmit priority for this VC.
InCells	Number of incoming cells on this VC.
OutCells	Number of outgoing cells on this VC.
InPktDrops	A non-zero value for the InPktDrops of a VC counter suggests that the ATM interface is running out of packet buffers for an individual VC, or is exceeding the total number of VC buffers that can be shared by the VCs.
OutPktDrops	The PA-A3 driver increments the OutPktDrops counter when a VC fills its individual transmit buffer quota. The purpose of the quota is to prevent a consistently over-subscribed VC from grabbing all of the packet buffer resources and hindering other VCs from transmitting normal traffic within their traffic contracts.
InCellDrops	Number of incoming cells dropped on this VC.
OutCellDrops	Number of outgoing cells dropped on this VC.
InByteDrops	Number of incoming bytes that are dropped on this VC.
OutByteDrops	Number of outgoing bytes that are dropped on this VC.
CrcErrors	Number of cyclic redundancy check (CRC) errors on this VC.
SarTimeOuts	Number of segmentation and reassembly sublayer time-outs on this VC.
OverSizedSDUs	Number of over-sized service data units on this VC
LengthViolation	Number of length violations on this VC. A length violation occurs when a reassembled packet is dropped without checking the CRC.
CPIErrors	The Common Part Indicator error field is a one octet field in the AAL5 encapsulation of an ATM cell and must be set to 0. If it is received with some other value, it is flagged as an error by the interface. For example, this error may indicate data corruption.
Out CLP	Number of Packets and/or cells where the Output Cell Loss Priority bit is set.
OutAS	Number of autonomous-switched or silicon-switched output packets.
OAM cells received	Number of OAM cells received on this VC.
OAM cells sent	Number of OAM cells sent on this VC.
TTL	Time to live in ATM hops across the VC.
VC owner	IP Multicast address of the group.

Related Commands

Command	Description
atm nsap-address	Sets the NSAP address for an ATM interface using SVC mode.
show xtagatm vc	Displays information about the VCs on the extended MPLS ATM interfaces.

show atm vp

To display the statistics for all virtual paths (VPs) on an interface or for a specific VP, use the **show atm vp** command in privileged EXEC mode.

show atm vp [*vpi*]

Syntax Description

vpi	(Optional) ATM network virtual path identifier (VPI) of the permanent virtual path. The range is from 0 to 255. The VPI is an 8-bit field in the header of the ATM cell.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.1	This command was introduced.

Examples

The following is sample output from the **show atm vp** command. This output shows the interface name, the status of the interface, the administrative status of the interface, the port type, and the number of channels in use on the interface. The status of the interface can be UP (in operation) or DOWN (not in operation).

```
Router# show atm vp 1

ATM6/0  VPI: 1, PeakRate: 155000, CesRate: 1742, DataVCs: 1, CesVCs:1, Status: ACTIVE

     VCD    VCI   Type   InPkts   OutPkts   AAL/Encap     Status
     1      100   PVC    n/a      n/a       CES-AAL1      ACTIVE
     13     13    PVC    0        0         AAL5-SNAP     ACTIVE
     409    3     PVC    0        0         F4 OAM        ACTIVE
     410    4     PVC    0        0         F4 OAM        ACTIVE

   TotalInPkts: 0, TotalOutPkts: 0, TotalInFast: 0, TotalOutFast: 0, TotalBroadcasts: 0
```

Table 13 describes the fields shown in the display.

Table 13 show atm vp Field Descriptions

Field	Description
ATM6/0	Interface type, slot, and port number of the VP.
VPI	Virtual path identifier of the VP.
PeakRate	Maximum rate, in kbps, at which the VP can send data. Range is 84 kbps to line rate. The default is the line rate.
CesRate	Total circuit emulation service (CES) bandwidth allocated for the VP.
DataVCs	Number of data virtual circuits (VCs) on the VP.
CesVCs	Number of CES VC on the VP.
Status	Current status of the VP. Values are ACTIVE and INACTIVE.

Table 13 show atm vp Field Descriptions (continued)

Field	Description
VCD	Virtual circuit descriptor of the VC associated with this VP.
VCI	Virtual channel identifier of the VC associated with this VP.
Type	Type of VC associated with this VP. Values are PVC and SVC.
InPkts	Number of packets received on the VP.
OutPkts	Number of packets transmitted on the VP.
AAL/Encap	Type of encapsulation used on the VC associated with this VP.
Status	Status of the VP (ACTIVE or INACTIVE).
TotalInPkts:	Total number of input packets process-switched and fast-switched on the VP.
TotalOutPkts:	Total number of output packets process-switched and fast-switched on the VP.
TotalInFast	Total number of input packets fast-switched.
TotalOutFast:	Total number of output packets fast-switched.
TotalBroadcasts:	Total number of broadcast packets fast-switched.

Related Commands

Command	Description
atm pvp	Creates a PVP used to multiplex (or bundle) one or more VCs (especially CES and data VCs).

show ces circuit

To display detailed circuit information for the constant bit rate (CBR) interface, use the **show ces circuit** command in privileged EXEC mode.

show ces circuit [**interface cbr** *slot/port* [*circuit-number*]]

Syntax Description

interface cbr *slot/port*	(Optional) Slot and port number of the CBR interface.
circuit-number	(Optional) Circuit identification. For unstructured service, use 0. For T1 structure service, the range is from 1 to 24. For E1 structure service, the range is from 1 to 31.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.1	This command was introduced.

Examples

The following is sample output from the **show ces circuit** command.

```
Router # show ces circuit

Interface  Circuit  Circuit-Type     X-interface   X-vpi   X-vci  Status
 CBR6/0      1       HardPVC           ATM6/0        0       34   UP
 CBR6/1      1       HardPVC           ATM6/1        0       34   UP
```

Table 14 describes the fields shown in the display.

Table 14 show ces circuit Field Descriptions

Field	Description
Interface	Type, slot, and port number of the interface.
Circuit	Circuit number assigned to the PVC.
Circuit-Type	Type of circuit.Values are HardPVC or SoftPVC. Only HardPVC is supported on the ATM-CES port adapter.
X-interface	Type, slot, and port number of the destination interface.
X-vpi	Virtual path identifier of the destination interface.
X-vci	Virtual channel identifier of the destination interface.
Status	State of the circuit. Values are Up and Down.

The following is sample output from the **show ces circuit** command for a circuit 1 on CBR interface 6/0:

```
Router# show ces circuit interface cbr 6/0 1

circuit: Name CBR6/0:1, Circuit-state ADMIN_UP / Interface CBR6/0, Circuit_id 1,
Port-Type T1, Port-State UP
Port Clocking network-derived, aal1 Clocking Method CESIWF_AAL1_CLOCK_Sync
Channel in use on this port: 1
Channels used by this circuit: 1
Cell-Rate: 171, Bit-Rate 64000
cas OFF, cell-header 0X3E80 (vci = 1000)
Configured CDV 2000 usecs, Measured CDV unavailable
ErrTolerance 8, idleCircuitdetect OFF, onHookIdleCode 0x0
state: VcActive, maxQueueDepth       128, startDequeueDepth       111
Partial Fill:       47, Structured Data Transfer 24
HardPVC
src: CBR6/0 vpi 0, vci 16
Dst: ATM6/0 vpi0, vci 1000
```

Table 15 describes the fields shown in the display.

Table 15 show ces circuit interface Field Descriptions

Field	Description
circuit Name	Name of the circuit specified with the **ces circuit** interface command.
Circuit-state	Current configuration state of the circuit. Values are ADMIN_UP or ADMIN_DOWN.
Interface	Type, slot, and port number of the interface.
Circuit_ID	Circuit identification specified with the **ces pvc** interface command.
Port-Type	Type of interface on the ATM-CES port adapter. Values are T1 and E1.
Port-State	Current status of the port. Values are Up and Down.
Port Clocking	Clocking mode used by the interface specified with the **ces dsx1 clock** interface command. Values are Loop-Timed and Network-Derived Adaptive.
aal1 Clocking Method	AAL1 clocking mode used by the interface specified with the **ces aal1 clock** interface command. Values are Adaptive, Synchronous Residual Time Stamp (SRTS), and Synchronous.
Channel in use on this port	Number of active channels used by this interface.
Channels used by this circuit	Number of channels used by the circuit.
Cell-Rate	Number of cells transmitted or received on the interface per second.
Bit-Rate	Speed at which the cells are transmitted or received.
cas	Indicates whether channel-associated signaling (CAS) is enabled on the interface with the **ces circuit** interface command.
cell-header	ATM cell header VCI bytes used for debugging only.
Configured CDV	Indicates the peak-to-peak cell delay variation (CDV) requirement (CDV) in milliseconds specified with the **ces circuit** interface command. The range for CDV is 1 through 65535 milliseconds. The default is 2000 milliseconds.
Measured CDV	Indicates the actual cell delay variation in milliseconds.
ErrTolerance	For internal use only.

Table 15 show ces circuit interface Field Descriptions (continued)

Field	Description
idleCircuitdetect	Indicates whether idle circuit detection is enabled (ON) or disabled (OFF).
onHookIdleCode	Indicates that the on-hook detection feature is enabled with the **ces circuit** interface command and the hex value (0 through F) that indicates a 2 or 4 bit AB[CD] pattern to detect on-hook. The AB[CD] bits are determined by the manufacturer of the voice/video telephony device that is generating the CBR traffic.
state	Current state of the circuit. Values are VcActive, VcInactive, VcLOC (loss of cell), or VcAlarm (alarm condition).
maxQueueDepth	Maximum queue depth in bits.
startDequeueDepth	Start dequeue depth in bits.
Partial Fill	Indicates the partial AAL1 cell fill service for structured service only specified by the **ces circuit** interface command. The range is 0 through 47. The default is 47.
Structured Data Transfer	Size (in bytes) of the structured data transfer frame.
HardPVC	Only hard PVC are supported by the ATM-CES port adapter.
src	Source interface type, slot, and port number and VPI and VCI for the circuit.
Dst	Destination interface interface type, slot, and port number and the VPI and VCI for the circuit.

Related Commands

Command	Description
show ces circuit	Displays detailed circuit information for the CBR interface.
show ces status	Displays the status of the ports on the ATM-CES port adapter.

show ces interface cbr

To display detailed constant bit rate (CBR) port information, use the **show ces interface cbr** command in privileged EXEC mode.

show ces interface cbr *slot/port*

Syntax Description

slot/port	Slot and port number of the CES interface.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.1	This command was introduced.

Examples

The following is sample output from the **show ces interface cbr** command for CBR interface 6/0:

```
Router# show ces interface cbr 6/0

Interface:      CBR6/0          Port-type:T1-DCU
IF Status:      UP              Admin Status: UP
Channels in use on this port: 1
LineType: ESF           LineCoding: B8ZS  LoopConfig: NoLoop
SignalMode: NoSignalling   XmtClockSrc: network-derived
DataFormat: Structured     AAL1 Clocking Mode: Synchronous  LineLength: 0_110
LineState: LossOfSignal
Errors in the Current Interval:
  PCVs        0   LCVs        0   ESs         0   SESs        0   SEFSs       0
  UASs        0   CSSs        0   LESs        0   BESs        0   DMs         0
Errors in the last 24Hrs:
  PCVs      514   LCVs        0   ESs         0   SESs        1   SEFSs       0
  UASs        0   CSSs        0   LESs        0   BESs        0   DMs         0
Input  Counters: 0 cells, 0 bytes
Output Counters: 0 cells, 0 bytes
```

Table 16 describes the fields shown in the display.

Table 16 show ces interface cbr Field Descriptions

Field	Description
Interface	Type, slot, and port number of the interface.
Port-type	Type of port on the ATM-CES port adapter. Values are T1-DCU and E1-DCU.
IF Status	Status of the interface. Values are Up and Down.
Admin Status	Configured status of the interface. Values are Up and Down (administratively configured down).
Channels in use on this port	Number of active channels used by this interface.

Table 16 show ces interface cbr Field Descriptions (continued)

Field	Description
LineType	Framing used on the interface specified with the **ces dsx1 framing** interface command. Values (for T1) are ESF and SF; (for E1) E1-CRC-MFCASLT, E1-CRC-MFLT, E1-LT, and E1-MFCASLT.
LineCoding	Line coding used on the interface specified with the **ces dsx1 linecode** interface command. Values (for T1) are AMI and B8ZS; (for E1) HDB3.
LoopConfig	Indicates whether the interface in in a loop state specified by the **ces dsx1 loopback** interface command. Values are line loopback, payload loopback, and noloop.
SignalMode	For T1 to use robbed-bit signaling or not.
XmitClockSrc	Transmit clock source specified by the **ces dsx1 clock** interface command. Values are loop-timed or network-derived.
DataFormat	Type of CES services specified by the **ces aal1 service** interface command. Values are structured or unstructured.
AAL1 Clocking Mode	AAL1 clocking mode used by the interface specified with the **ces aal1 clock** interface command. Values are adaptive, synchronous residual time stamp (SRTS), or synchronous.
LineLength	Cable length specified by the **ces dsx1 lbo** interface command. Values are 0-110, 10-200, 220-330, 330-440, 440-550, 550-660, 660-above, and square-pulse.
LineState	Current status of the line. Values are: • Unknown • NoAlarm • RcvFarEndLOF • XmtFarEndLOF • RcvAIS • XmtAIS • LossOfFrame • LossOfSignal • LoopbackState • T16AIS
Errors in the Current Interval	Error statistics received during the current 15-minute interval.
PCVs	Number of Path Code Violations (PCVs). PCVs indicate a frame synchronization bit error in the D4 and E1 no-CRC formats, or a CRC error in the ESF and E1 CRC formats.
LCVs	Number of Line Code Violations (LCVs). LCVs indicate the occurrence of either a Bipolar Violation (BPV) or Excessive Zeros (EXZ) error event.

Table 16 show ces interface cbr Field Descriptions (continued)

Field	Description
ESs	Number of errored seconds. In ESF and E1 CRC links, an Errored Second is a second in which one of the following are detected: one or more Path Code Violations, one or more Out of Frame defects, one or more Controlled Slip events, or a detected AIS defect. For SF and E1 no-CRC links, the presence of Bipolar Violations also triggers an Errored Second.
SESs	Number of Severely Errored Seconds (SESs). A SESs is a second with 320 or more path code violation errors events, one or more Out of Frame defects, or a detected AIS defect.
SEFSs	Number of Severely Errored Framing Seconds (SEFS). SEFS is a second with one or more Out of Frame defects or a detected incoming AIS.
UASs	Number of Unavailable Seconds (UASs). UAS is a count of the total number of seconds on the interface.
CSSs	Number of Controlled Slip Second (CSS). CSS is a 1-second interval containing one or more controlled slips.
LESs	Number of Line Errored Seconds (LES). LES is a second in which one or more Line Code Violation errors are detected.
BESs	Number of Bursty Errored Seconds (BES). BES is a second with fewer than 320 and more than one Path Coding Violation error, no Severely Errored Frame defects, and no detected incoming AIS defects. Controlled slips are not included in this parameter.
DMs	Number of Degraded Minutes (DMs). A degraded minute is one in which the estimated error rate exceeds 1E-6 but does not exceed 1E-3. For more information, refer to RFC 1406.
Errors in the last 24Hrs	Error statistics received during the during the last 24 hours.
Input Counters	Number of cells and bytes received on the interface.
Output Counters	Number of cells and bytes.

Related Commands

Command	Description
show interface cbr	Displays the information about the CBR interface on the ATM-CES port adapter.

show ces status

To display the status of the ports on the ATM-CES port adapter, use the **show ces status** command in privileged EXEC mode.

show ces status

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.1	This command was introduced.

Examples

The following is sample output from the **show ces status** command. This output shows the interface name, the status of the interface, the administrative status of the interface, the port type, and the number of channels in use on the interface. The status of the interface can be UP (in operation) or DOWN (not in operation).

```
Router# show ces status

Interface          IF      Admin         Port   Channels in
  Name           Status   Status         Type       use
-------------- -------- --------- ----------- -----------
     CBR0/0/0       UP        UP           T1        1-24
     CBR0/0/1       UP        UP           T1        1-24
     CBR0/0/2       UP        UP           T1        1-24
     CBR0/0/3       UP        UP           T1
```

Related Commands

Command	Description
show ces circuit	Displays detailed circuit information for the CBR interface.

show ces

To display details about a Circuit Emulation Service (CES) connection, use the **show ces** privileged EXEC command.

show ces [*slot*/*port*]

Syntax Description

slot/*port*	(Optional) Slot and port number of the CES interface.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(2)T	This command was introduced.

Usage Guidelines

This command is used on Cisco 2600 series and Cisco 3600 series routers that have OC-3/STM-1 ATM CES network modules.

Examples

The following is sample output from the **show ces** command.

```
Router# show ces 3/0

CURRENT VPD CES CLOCK:Set to ATM
ATM CLOCKING:Clock Source is Line
VPD BASE ADDRESS->(0x3DE00000)
Multi Mode VPD Installed
VIC/WIC PRESENT->  2 port drop&insert T1 humvee installed
CONTROLLER CLOCKING-> PORT[0]:Clock is Internal
CONTROLLER CLOCKING-> PORT[1]:Clock is Internal
DCU [0]:
 port State:   active       alarm State:normal         Loop Type:   noloop
 Clocking Mode:loopTimed  Data Mode:  crossConnect   Framing Type:  d4
 Line Coding:  ami          t1Cas:      off            tsInUse:     0000001C
  VPI/VCI 6/78  CES AAL1 Input cells 210252  CES AAL1 Output cells 210252
        imRestart 0  xcUndfrmslp 2  overflow 0
DCU [1]:
 port State:   inactive     alarm State:normal         Loop Type:   noloop
 Clocking Mode:synchronous  Data Mode:  clearChannel   Framing Type:none
 Line Coding:  ami          t1Cas:      off            tsInUse:     00000000
DCU [2]:
 port State:   inactive     alarm State:normal         Loop Type:   noloop
 Clocking Mode:synchronous  Data Mode:  clearChannel   Framing Type:none
 Line Coding:  ami          t1Cas:      off            tsInUse:     00000000
DCU [3]:
 port State:   inactive     alarm State:normal         Loop Type:   noloop
 Clocking Mode:synchronous  Data Mode:  clearChannel   Framing Type:none
 Line Coding:  ami          t1Cas:      off            tsInUse:     00000000
```

Table 17 describes significant fields shown in the display.

Table 17 show ces Field Descriptions

Field	Description
CURRENT VPD CES CLOCK	Clock being used by the CES function.
ATM CLOCKING	Clock being used by the ATM interface.
VIC/WIC PRESENT	Type of WIC plugged into the Network Module.
CONTROLLER CLOCKING	Clock being used by the T1 controller.
port State	Current state of port. Values are active or inactive.
alarm State	Current state of the CES port.
Clocking Mode	CES circuit clocking mode.
Data Mode	CES circuit data mode.
Framing Type	CES port framing type. Values are d4 and esf.
Line Coding	CES port line code type. Values are ami and b8zs.
t1Cas	Current state of T1 Channel Associated Signalling on CES port. Values are on and off.
tsInUse	Bit mask of timeslots in use.
VPI/VCI	VPI/VCI used by CES circuit.
CES AAL1 Input cells	Number of CES cells received.
CES AAL1 Output cells	Number of CES cells transmitted.
xcUndfrmslp	Structured CES circuit Under Frame Slips.
overflow	CES circuit overflows.

Related Commands

Command	Description
ces	Configures CES on a router port.

show controllers atm

To display information about an inverse multiplexing over ATM (IMA) group, use the **show controllers atm** privileged EXEC command.

Cisco 2600 and 3600 Series

show controllers atm [*slot*/**ima** *group-number*]

Cisco 7200 Series

show controller atm [*slot*/*port*]

or

show controllers atm [*slot*/**ima***group-number*]

Cisco 7500 Series (physical port hardware information)

show controllers atm [*slot*/*port-adapter*/*port*]

Cisco 7500 Series (IMA group hardware information)

show controllers atm [*slot*/*port-adapter*/**ima***group-number*]

Syntax Description

slot/	(Optional) ATM slot number.
ima	(Optional) This keyword indicates an IMA group specification rather than a port value for a UNI interface.
group-number	(Optional) Enter an IMA group number from 0 to 3. If you specify the group number, do not insert a space between **ima** and the number.
port	(Optional) ATM port number.
port-adapter/	(Optional) ATM port adapter.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.2 GS	This command was introduced.
12.0(5)T and 12.0(5)XK	This command was modified to support IMA groups on Cisco 2600 and 3600 series routers.
12.0(5)XE	Support for Cisco 7200 and 7500 series routers was added.
12.0(7)XE1	Support for Cisco 7100 series routers was added.
12.1(5)T	Support for Cisco 7100,7200, and 7500 series routers was integrated into Cisco IOS Release 12.1(5)T.

Usage Guidelines

Use this command to monitor and diagnose ATM IMA links and groups.

Examples

Cisco 7100 or 7200 Series Example

On Cisco 7100 series or 7200 series routers, the following example displays detailed information about IMA group hardware related information. It includes the configuration of IMA hardware and IMA alarms.

```
Router# show controllers atm 1/ima0

Interface ATM1/ima0 is up
Hardware is IMA PA - DS1 (1Mbps)
Framer is PMC PM7344, SAR is LSI ATMIZER II
Firmware rev:G102, ATMIZER II rev:3
  idb=0x61DE9F10, ds=0x6185C0A0, vc=0x6187D3C0, pa=0x6184AF40
  slot 1, unit 9, subunit 0, fci_type 0x00BA, ticks 701720
  400 rx buffers:size=512, encap=64, trailer=28, magic=4
Curr Stats:
  rx_cell_lost=0, rx_no_buffer=0, rx_crc_10=0
  rx_cell_len=0, rx_no_vcd=0, rx_cell_throttle=0, tx_aci_err=0
Rx Free Ring status:
  base=0x3CFF0040, size=1024, write=320
Rx Compl Ring status:
  base=0x338DCE40, size=2048, read=1275
Tx Ring status:
  base=0x3CFE8040, size=8192, write=700
Tx Compl Ring status:
  base=0x338E0E80, size=2048, read=344
BFD Cache status:
  base=0x61878340, size=5120, read=5107
Rx Cache status:
  base=0x61863D80, size=16, write=11
Tx Shadow status:
  base=0x618641C0, size=8192, read=687, write=700
Control data:
  rx_max_spins=12, max_tx_count=25, tx_count=13
  rx_threshold=267, rx_count=11, tx_threshold=3840
  tx bfd write indx=0x27, rx_pool_info=0x61863E20
Control data base address:
       rx_buf_base = 0x038A15A0        rx_p_base = 0x6185CB40
            rx_pak = 0x61863AF0              cmd = 0x6185C320
       device_base = 0x3C800000     ima_pa_stats = 0x038E2FA0
        sdram_base = 0x3CE00000       pa_cmd_buf = 0x3CFFFC00
       vcd_base[0] = 0x3CE3C100      vcd_base[1] = 0x3CE1C000
         chip_dump = 0x038E3D7C       dpram_base = 0x3CD80000
   sar_buf_base[0] = 0x3CE4C000  sar_buf_base[1] = 0x3CF22000
       bfd_base[0] = 0x3CFD4000      bfd_base[1] = 0x3CFC0000
       acd_base[0] = 0x3CE88360      acd_base[1] = 0x3CE5C200
     pci_atm_stats = 0x038E2EC0
ATM1/ima0 is up
        hwgrp number = 1
grp tx up reg= 0x5, grp rx up reg= 0x3, rx dcb reg= 0xD4 0x4, tx links grp reg=
0x3, scci reg= 0x3C, ima id reg= 0x0, group status  reg= 0xA2, tx timing reg= 0x
20, tx test reg= 0x21, tx test pattern reg= 0x41, rx test pattern reg= 0x42, icp
 cell link info  reg= 0xFC, icp cell link info  reg= 0xFC, icp cell link info  r
eg= 0x0, icp cell link info  reg= 0x0, icp cell link info  reg= 0x0, icp cell li
nk info  reg= 0x0, icp cell link info  reg= 0x0, icp cell link info  reg= 0x0
```

Cisco 2600 or 3600 Series Example

On a Cisco 2600 or 3600 series router, the following example displays detailed information about IMA group 0 on ATM interface 2:

```
router# show controller atm 0/ima3

Interface ATM0/IMA3 is up
  Hardware is ATM IMA
LANE client MAC address is 0050.0f0c.148b
  hwidb=0x61C2E990, ds=0x617D498C
  slot 0, unit 3, subunit 3
  rs8234 base 0x3C000000, slave base 0x3C000000
  rs8234 ds 0x617D498C
  SBDs - avail 2048, guaranteed 3, unguaranteed 2045, starved 0
 Seg VCC table 3C00B800, Shadow Seg VCC Table 617EF76C, VCD Table 61805798
 Schedule table 3C016800, Shadow Schedule table 618087C4, Size 63D
 RSM VCC Table 3C02ED80, Shadow RSM VCC Table 6180C994
 VPI Index Table 3C02C300, VCI Index Table 3C02E980
 Bucket2 Table 3C01E500, Shadow Bucket2 Table 6180A0E4
 MCR Limit Table 3C01E900, Shadow MCR Table 617D2160
 ABR template 3C01EB00, Shadow template 614DEEAC
 RM Cell RS Queue 3C02C980
 Queue           TXQ Addr  Pos  StQ Addr  Pos
 0  UBR CHN0     3C028B00  0    03118540  0
 1  UBR CHN1     3C028F00  0    03118D40  0
 2  UBR CHN2     3C029300  0    03119540  0
 3  UBR CHN3     3C029700  0    03119D40  0
 4  VBR/ABR CHN0 3C029B00  0    0311A540  0
 5  VBR/ABR CHN1 3C029F00  0    0311AD40  0
 6  VBR/ABR CHN2 3C02A300  0    0311B540  0
 7  VBR/ABR CHN3 3C02A700  0    0311BD40  0
 8  VBR-RT CHN0  3C02AB00  0    0311C540  0
 9  VBR-RT CHN1  3C02AF00  0    0311CD40  0
 10 VBR-RT CHN2  3C02B300  0    0311D540  0
 11 VBR-RT CHN3  3C02B700  0    0311DD40  0
 12 SIG          3C02BB00  0    0311E540  0
 13 VPD          3C02BF00  0    0311ED40  0

 Queue           FBQ Addr  Pos  RSQ Addr  Pos
 0  OAM          3C0EED80  255  0311F600  0
 1  UBR CHN0     3C0EFD80  0    03120600  0
 2  UBR CHN1     3C0F0D80  0    03121600  0
 3  UBR CHN2     3C0F1D80  0    03122600  0
 4  UBR CHN3     3C0F2D80  0    03123600  0
 5  VBR/ABR CHN0 3C0F3D80  0    03124600  0
 6  VBR/ABR CHN1 3C0F4D80  0    03125600  0
 7  VBR/ABR CHN2 3C0F5D80  0    03126600  0
 8  VBR/ABR CHN3 3C0F6D80  0    03127600  0
 9  VBR-RT CHN0  3C0F7D80  0    03128600  0
 10 VBR-RT CHN1  3C0F8D80  255  03129600  0
 11 VBR-RT CHN2  3C0F9D80  0    0312A600  0
 12 VBR-RT CHN3  3C0FAD80  0    0312B600  0
 13 SIG          3C0FBD80  255  0312C600  0
SAR Scheduling channels:  -1 -1 -1 -1 -1 -1 -1 -1
ATM channel number is 1
link members are 0x7, active links are 0x0
Group status is blockedNe, 3 links configured,
Group Info: Configured links bitmap 0x7, Active links bitmap 0x0,
    Tx/Rx IMA_id 0x3/0x63,
    NE Group status is startUp,
    frame length 0x80, Max Diff Delay 0,
    1 min links, clock mode ctc, symmetry symmetricOperation, trl 0,
    Group Failure status is startUpNe.
```

```
    Test pattern procedure is disabled
SAR counter totals across all links and groups:
   0 cells output, 0 cells stripped
   0 cells input, 0 cells discarded, 0 AAL5 frames discarded
   0 pci bus err, 0 dma fifo full err, 0 rsm parity err
   0 rsm syn err, 0 rsm/seg q full err, 0 rsm overflow err
   0 hs q full err, 0 no free buff q err, 0 seg underflow err
   0 host seg stat q full err
```

Related Commands

Command	Description
show controllers atm	Displays information about an IMA group.
show ima interface atm	Provides information about all configured IMA groups or a specific IMA group.

show dxi map

To display all the protocol addresses mapped to a serial interface, use the **show dxi map** EXEC command.

show dxi map

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
10.3	This command was introduced.

Examples

The following is sample output from the **show dxi map** command. It displays output for several previously defined ATM-DXI maps that defined Apollo, IP, DECnet, CLNS, and AppleTalk protocol addresses, various encapsulations, and broadcast traffic.

```
Router# show dxi map

Serial0 (administratively down): ipx 123.0000.1234.1234
   DFA 69(0x45,0x1050), static, vpi = 4, vci = 5,
   encapsulation: SNAP
Serial0 (administratively down): appletalk 2000.5
   DFA 52(0x34,0xC40), static, vpi = 3, vci = 4,
   encapsulation: NLPID
Serial0 (administratively down): ip 172.21.177.1
   DFA 35(0x23,0x830), static,
   broadcast, vpi = 2, vci = 3,
   encapsulation: VC based MUX,
   Linktype IP
```

Table 18 explains significant fields shown in the display.

Table 18 show dxi map Field Descriptions

Field	Description
DFA	Data Exchange Interface (DXI) Frame Address, similar to a data-link connection identifier (DLCI) for Frame Relay. The DFA is shown in decimal, hexadecimal, and DXI header format. The router computes this address value from the virtual path identifier (VPI) and virtual channel identifier (VCI) values.
encapsulation	Encapsulation type selected by the **dxi pvc** command. Displayed values can be *SNAP*, *NLPID*, or *VC based MUX*.
Linktype	Value used only with MUX encapsulation and therefore with only a single network protocol defined for the permanent virtual circuit (PVC). Maps configured on a PVC with MUX encapsulation must have the same link type.

show dxi pvc

To display the permanent virtual circuit (PVC) statistics for a serial interface, use the **show dxi pvc** EXEC command.

show dxi pvc

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
10.3	This command was introduced.

Examples

The following is sample output from the **show dxi pvc** command. It displays output for ATM-DXI PVCs previously defined for serial interface 0.

```
Router# show dxi pvc

PVC Statistics for interface Serial0 (ATM DXI)

DFA = 17, VPI = 1, VCI = 1, PVC STATUS = STATIC, INTERFACE = Serial0

  input pkts 0             output pkts 0            in bytes 0
  out bytes 0              dropped pkts 0

DFA = 34, VPI = 2, VCI = 2, PVC STATUS = STATIC, INTERFACE = Serial0

  input pkts 0             output pkts 0            in bytes 0
  out bytes 0              dropped pkts 0

DFA = 35, VPI = 2, VCI = 3, PVC STATUS = STATIC, INTERFACE = Serial0

  input pkts 0             output pkts 0            in bytes 0
  out bytes 0              dropped pkts 0
```

Table 19 describes significant fields shown in the display.

Table 19 show dxi pvc Field Descriptions

Field	Description
DFA	Data Exchange Interface (DXI) Frame Address, similar to a data-link connection identifier (DLCI) for Frame Relay. The DFA is shown in decimal, hexadecimal, and DXI header format. The router computes this address value from the virtual path identifier (VPI) and virtual channel identifier (VCI) values.
PVC STATUS = STATIC	Only static maps are supported. Maps are not created dynamically.
input pkts	Number of packets received.

Table 19 show dxi pvc Field Descriptions (continued)

Field	Description
output pkts	Number of packets transmitted.
in bytes	Number of bytes in all packets received.
out bytes	Number of bytes in all packets transmitted.
dropped pkts	Should display a zero (0) value. A nonzero value indicates a configuration problem, specifically that a PVC does not exist.

show ima interface atm

To display information about all configured inverse multiplexing over ATM (IMA) groups or a specific group, use the **show ima interface atm** command in privileged EXEC mode.

Cisco 2600 and 3600 Series

show ima interface atm [*slot*/**ima***group-number*] [**detail**]

Cisco 7200 Series

show ima interface atm [*slot*/*port*] [**detail**]

or

show ima interface atm [*slot*/*port-adapter*/**ima***group-number*] [**detail**]

Cisco 7500 Series

show ima interface atm [*slot*/*port-adapter*/*slot*] [**detail**]

or

show ima interface atm [*slot*/*port-adapter*/**ima***group-number*] [**detail**]

Syntax Description

slot/	(Optional) ATM slot number.
ima	(Optional) This keyword indicates an IMA group specification rather than a port value for a UNI interface.
group-number	(Optional) Enter an IMA group number from 0 to 3. If you specify the group number, do not insert a space between **ima** and the number.
port	(Optional) ATM port number.
port-adapter/	(Optional) ATM port adapter.
detail	(Optional) To obtain detailed information, use this keyword.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.0(5)XK	This command was introduced.
12.0(5)XE	Support for Cisco 7200 and 7500 series routers was added.
12.0(7)XE1	Support for Cisco 7100 series routers was added.
12.1(5)T	Support for Cisco 7100, 7200, and 7500 series routers was integrated in Cisco IOS Release 12.1(5)T.

Usage Guidelines

Use this command to monitor the status of IMA group links.

Examples

On Cisco 7100 or 7200 series routers, the following example displays detailed information about IMA group 0 on ATM interface 2. If you do not enter the **detail** keyword, you do not see the IMA MIB information or the "Detailed Link Information" output.

```
Router# show ima interface atm 5/ima0 detail

ATM5/ima0 is up
        ImaGroupState:NearEnd = operational, FarEnd = operational
        ImaGroupFailureStatus  = noFailure
IMA Group Current Configuration:
        ImaGroupMinNumTxLinks = 2    ImaGroupMinNumRxLinks = 2
        ImaGroupDiffDelayMax  = 250  ImaGroupNeTxClkMode   = common(ctc)
        ImaGroupFrameLength   = 128  ImaTestProcStatus     = disabled
        ImaGroupTestLink      = 0    ImaGroupTestPattern   = 0xFF
IMA MIB Information:
        ImaGroupSymmetry        = symmetricOperation
        ImaGroupFeTxClkMode     = common(ctc)
        ImaGroupRxFrameLength   = 128
        ImaGroupTxTimingRefLink = 0     ImaGroupRxTimingRefLink = 0
        ImaGroupTxImaId         = 0     ImaGroupRxImaId         = 0
        ImaGroupNumTxCfgLinks   = 2     ImaGroupNumRxCfgLinks   = 2
        ImaGroupNumTxActLinks   = 2     ImaGroupNumRxActLinks   = 2
        ImaGroupLeastDelayLink  = 0     ImaGroupDiffDelayMaxObs = 0
IMA group counters:
        ImaGroupNeNumFailures   = 1     ImaGroupFeNumFailures   = 2
        ImaGroupUnAvailSecs     = 18    ImaGroupRunningSecs     = 241
IMA Detailed Link Information:

ATM5/0 is up
        ImaLinkRowStatus = active
        ImaLinkIfIndex   = 1            ImaLinkGroupIndex = 47
        ImaLinkState:
                NeTx = active
                NeRx = active
                FeTx = active
                FeRx = active
        ImaLinkFailureStatus:
                NeRx = noFailure
                FeRx = noFailure
        ImaLinkTxLid           = 0      ImaLinkRxLid           = 0
        ImaLinkRxTestPattern   = 64     ImaLinkTestProcStatus  = disabled
        ImaLinkRelDelay        = 0
IMA Link counters :
        ImaLinkImaViolations   = 1
        ImaLinkNeSevErroredSec = 10     ImaLinkFeSevErroredSec = 10
        ImaLinkNeUnavailSec    = 7      ImaLinkFeUnAvailSec    = 8
        ImaLinkNeTxUnusableSec = 17     ImaLinkNeRxUnUsableSec = 16
        ImaLinkFeTxUnusableSec = 17     ImaLinkFeRxUnusableSec = 16
        ImaLinkNeTxNumFailures = 0      ImaLinkNeRxNumFailures = 2
        ImaLinkFeTxNumFailures = 1      ImaLinkFeRxNumFailures = 1

ATM5/1 is up
        ImaLinkRowStatus = active
        ImaLinkIfIndex   = 2            ImaLinkGroupIndex = 47
        ImaLinkState:
                NeTx = active
                NeRx = active
                FeTx = active
                FeRx = active
        ImaLinkFailureStatus:
                NeRx = noFailure
                FeRx = noFailure
        ImaLinkTxLid           = 1      ImaLinkRxLid           = 1
```

```
        ImaLinkRxTestPattern   = 64     ImaLinkTestProcStatus  = disabled
        ImaLinkRelDelay        = 0
IMA Link counters :
        ImaLinkImaViolations   = 1
        ImaLinkNeSevErroredSec = 10     ImaLinkFeSevErroredSec = 10
        ImaLinkNeUnavailSec    = 7      ImaLinkFeUnAvailSec    = 8
        ImaLinkNeTxUnusableSec = 16     ImaLinkNeRxUnUsableSec = 16
        ImaLinkFeTxUnusableSec = 16     ImaLinkFeRxUnusableSec = 16
        ImaLinkNeTxNumFailures = 0      ImaLinkNeRxNumFailures = 2
        ImaLinkFeTxNumFailures = 1      ImaLinkFeRxNumFailures = 1
```

On a Cisco 2600 or 3600 series router, the following example displays detailed information about IMA group 0 on ATM interface 2. Without the **detail** keyword, only the information up to "Detailed group Information:" appears.

```
Router# show ima interface atm 4/ima0 detail

Interface ATM2/IMA2 is up
        Group index is 2
        Ne state is operational, failure status is noFailure
        active links bitmap 0x30
    IMA Group Current Configuration:
        Tx/Rx configured links bitmap 0x30/0x30
        Tx/Rx minimum required links 1/1
        Maximum allowed diff delay is 25ms, Tx frame length 128
        Ne Tx clock mode CTC, configured timing reference link ATM2/4
        Test pattern procedure is disabled
    Detailed group Information:
        Tx/Rx Ima_id 0x22/0x40, symmetry symmetricOperation
        Number of Tx/Rx configured links 2/2
        Number of Tx/Rx active links 2/2
        Fe Tx clock mode ctc, Rx frame length 128
        Tx/Rx timing reference link 4/4
        Maximum observed diff delay 0ms, least delayed link 5
        Running seconds 32
        GTSM last changed 10:14:41 UTC Wed Jun 16 1999
    IMA Group Current Counters (time elapsed 33 seconds):
        3 Ne Failures, 3 Fe Failures, 4 Unavail Secs
    IMA Group Total Counters (last 0 15 minute intervals):
        0 Ne Failures, 0 Fe Failures, 0 Unavail Secs
    Detailed IMA link Information:

Interface ATM2/4 is up
        ifIndex 13, Group Index 2, Row Status is active
        Tx/Rx Lid 4/4, relative delay 0ms
        Ne Tx/Rx state active/active
        Fe Tx/Rx state active/active
        Ne Rx failure status is noFailure
        Fe Rx failure status is noFailure
        Rx test pattern 0x41, test procedure disabled
    IMA Link Current Counters (time elapsed 35 seconds):
        1 Ima Violations, 0 Oif Anomalies
        1 Ne Severely Err Secs, 2 Fe Severely Err Secs
        0 Ne Unavail Secs, 0 Fe Unavail Secs
        2 Ne Tx Unusable Secs, 2 Ne Rx Unusable Secs
        0 Fe Tx Unusable Secs, 2 Fe Rx Unusable Secs
        0 Ne Tx Failures, 0 Ne Rx Failures
        0 Fe Tx Failures, 0 Fe Rx Failures
    IMA Link Total Counters (last 0 15 minute intervals):
        0 Ima Violations, 0 Oif Anomalies
        0 Ne Severely Err Secs, 0 Fe Severely Err Secs
        0 Ne Unavail Secs, 0 Fe Unavail Secs
        0 Ne Tx Unusable Secs, 0 Ne Rx Unusable Secs
        0 Fe Tx Unusable Secs, 0 Fe Rx Unusable Secs
```

```
        0 Ne Tx Failures, 0 Ne Rx Failures
        0 Fe Tx Failures, 0 Fe Rx Failures

Interface ATM2/5 is up
        ifIndex 14, Group Index 2, Row Status is active
        Tx/Rx Lid 5/5, relative delay 0ms
        Ne Tx/Rx state active/active
        Fe Tx/Rx state active/active
        Ne Rx failure status is noFailure
        Fe Rx failure status is noFailure
        Rx test pattern 0x41, test procedure disabled
    IMA Link Current Counters (time elapsed 46 seconds):
        1 Ima Violations, 0 Oif Anomalies
        1 Ne Severely Err Secs, 2 Fe Severely Err Secs
        0 Ne Unavail Secs, 0 Fe Unavail Secs
        2 Ne Tx Unusable Secs, 2 Ne Rx Unusable Secs
        0 Fe Tx Unusable Secs, 2 Fe Rx Unusable Secs
        0 Ne Tx Failures, 0 Ne Rx Failures
        0 Fe Tx Failures, 0 Fe Rx Failures
    IMA Link Total Counters (last 0 15 minute intervals):
        0 Ima Violations, 0 Oif Anomalies
        0 Ne Severely Err Secs, 0 Fe Severely Err Secs
        0 Ne Unavail Secs, 0 Fe Unavail Secs
        0 Ne Tx Unusable Secs, 0 Ne Rx Unusable Secs
        0 Fe Tx Unusable Secs, 0 Fe Rx Unusable Secs
        0 Ne Tx Failures, 0 Ne Rx Failures
        0 Fe Tx Failures, 0 Fe Rx Failures
```

Related Commands

Command	Description
show controllers atm	Displays information about an IMA group.

show interface cbr

To display information about the constant bit rate (CBR) interface on the ATM-CES port adapter, use the **show interface cbr** command in privileged EXEC mode.

show interface cbr *interface-number*

Syntax Description

interface-number	Interface number (for example, 2/0).

Command Modes

Privileged EXEC

Command History

Release	Modification
11.1	This command was introduced.

Examples

The following is sample output from the **show interface cbr** command.

```
Router# show interface cbr 6/0

CBR6/0 is up, line protocol is up
  Hardware is DCU
  MTU 0 bytes, BW 1544 Kbit, DLY 0 usec, rely 255/255, load 248/255
  Encapsulation ET_ATMCES_T1, loopback not set
  Last input 00:00:00, output 00:00:00, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/0, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 1507000 bits/sec, 3957 packets/sec
  5 minute output rate 1507000 bits/sec, 3955 packets/sec
     3025960 packets input, 142220120 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     3030067 packets output, 142413149 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
```

Table 20 describes the fields shown in the display.

Table 20 show interface cbr Field Descriptions

Field	Description
CBR6/0 is...	Type, slot, and port number of the interface and indicates whether the interface hardware is currently active (whether carrier detect is present), down, or if it has been taken down by an administrator.
line protocol is...	Indicates whether the software processes that handle the line protocol think the line is usable (that is, whether keepalives are successful). Values are up, down, and administratively down.
Hardware is...	Hardware type.
MTU	Maximum transmission unit of the interface.

Table 20 show interface cbr Field Descriptions (continued)

Field	Description
BW	Bandwidth of the interface in kilobits per second.
DLY	Delay of the interface, in microseconds.
rely	Reliability of the interface as a fraction of 255 (255/255 is 100% reliability), calculated as an exponential average over 5 minutes.
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes. The calculation uses the value from the **bandwidth** interface configuration command.
Encapsulation	Encapsulation method assigned to interface.
loopback not set	Indicates whether or not loopback is set.
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface. Useful for knowing when a dead interface failed.
Last output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface.
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.
Last clearing	The time at which the counters that measure cumulative statistics (such as number of bytes transmitted and received) shown in this report were last reset to zero. Note that variables that might affect routing (for example, load and reliability) are not cleared when the counters are cleared. *** indicates that the elapsed time is too large to be displayed. 0:00:00 indicates that the counters were cleared more than 2^{31}ms (and less than 2^{32}ms) ago.
Queueing strategy	First-in, first-out queuing strategy (other queueing strategies you might see are priority-list, custom-list, and weighted fair).
Output queue, drops input queue, drops	Number of packets in output and input queues. Each number is followed by a slash, the maximum size of the queue, and the number of packets dropped due to a full queue.
5 minute input rate, 5 minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes.
packets input	Total number of error-free packets received by the system.
bytes input	Total number of bytes, including data and MAC encapsulation, in the error-free packets received by the system.
no buffer	Number of received packets discarded because there was no buffer space in the main system. Compare with ignored count. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.
broadcasts	Total number of broadcast or multicast packets received by the interface.
runts	Number of packets that are discarded because they are smaller than the medium's minimum packet size.

Table 20 show interface cbr Field Descriptions (continued)

Field	Description
giants	Number of packets that are discarded because they exceed the medium's maximum packet size.
input errors	Total number of no buffer, runts, giants, CRCs, frame, overrun, ignored, and abort counts. Other input-related errors can also increment the count, so that this sum may not balance with the other counts.
CRC	Cyclic redundancy checksum generated by the originating LAN station or far end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRCs is usually the result of collisions or a station transmitting bad data. On a serial link, CRCs usually indicate noise, gain hits or other transmission problems on the data link.
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets.
overrun	Number of times the serial receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.
ignored	Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. These buffers are different than the system buffers mentioned previously in the buffer description. Broadcast storms and bursts of noise can cause the ignored count to be incremented.
abort	Illegal sequence of one bits on the interface. This usually indicates a clocking problem between the interface and the data link equipment.
packets output	Total number of messages transmitted by the system.
bytes	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
underruns	Number of times that the transmitter has been running faster than the router can handle. This may never be reported on some interfaces.
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this may not balance with the sum of the enumerated output errors, as some datagrams may have more than one error, and others may have errors that do not fall into any of the specifically tabulated categories.
collisions	Because collisions do not occur on CBR interfaces, this statistic is always zero.
interface resets	Number of times an interface has been reset. The interface may be reset by the administrator or automatically when an internal error occurs.
output buffer failures	Number of no resource errors received on the output.
output buffers swapped out	Number of packets swapped to DRAM.

Related Commands

Command	Description
show ces interface cbr	Displays detailed CBR port information.

show interfaces atm

To display information about the ATM interface, use the **show interfaces atm** command in privileged EXEC mode.

Cisco 7500 series with AIP; Cisco 7200 series with ATM, ATM-CES, and enhanced ATM port adapter; Cisco 2600 and 3600 series with 1-port ATM-25 network module

show interfaces atm [*slot*/*port*]

Cisco 7500 series routers with the ATM port adapter and enhanced ATM port adapter

show interfaces atm [*slot*/*port-adapter*/*port*]

Syntax Description

slot/*port*	(Optional) ATM slot number and port number. Use this format for the following platform configurations: • The AIP on Cisco 7500 series routers. • The ATM port adapter, ATM-CES port adapter, or enhanced ATM port adapter on Cisco 7200 series routers. • The 1-port ATM-25 network module on Cisco 2600 and 3600 series routers.
slot/*port-adapter*/*port*	(Optional) ATM slot, port adapter, and port numbers. Use this format for the ATM port adapter or enhanced ATM port adapter on Cisco 2600 and 3600 series routers.

Command Modes

Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.

Examples

The following is sample output from the **show interfaces atm** command:

```
Router# show interfaces atm 4/0

ATM4/0 is up, line protocol is up
 Hardware is cxBus ATM
 Internet address is 10.108.97.165, subnet mask is 255.255.255.0
 MTU 4470 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
 ATM E164 Auto Conversion Interface
 Encapsulation ATM, loopback not set, keepalive set (10 sec)
 Encapsulation(s): AAL5, PVC mode
 256 TX buffers, 256 RX buffers, 1024 Maximum VCs, 1 Current VCs
 Signalling vc = 1, vpi = 0, vci = 5
 ATM NSAP address: BC.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.13
 Last input 0:00:05, output 0:00:05, output hang never
 Last clearing of "show interface" counters never
 Output queue 0/40, 0 drops; input queue 0/75, 0 drops
 Five minute input rate 0 bits/sec, 0 packets/sec
```

```
 Five minute output rate 0 bits/sec, 0 packets/sec
     144 packets input, 3148 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     154 packets output, 4228 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets, 0 restarts
```

The following is sample output from the **show interfaces atm** command for the ATM port adapter on a Cisco 7500 series router:

```
Router# show interfaces atm 0/0/0

ATM0/0/0 is up, line protocol is up
 Hardware is cyBus ATM
 Internet address is 10.1.1.1/24
 MTU 4470 bytes, sub MTU 4470, BW 156250 Kbit, DLY 80 usec, rely 255/255, load 1/255
 Encapsulation ATM, loopback not set, keepalive set (10 sec)
 Encapsulation(s): AAL5, PVC mode
 256 TX buffers, 256 RX buffers,
 2048 maximum active VCs, 1024 VCs per VP, 1 current VCCs
 VC idle disconnect time: 300 seconds
 Last input never, output 00:00:05, output hang never
 Last clearing of "show interface" counters never
 Queueing strategy: fifo
 Output queue 0/40, 0 drops; input queue 0/75, 0 drops
 5 minute input rate 0 bits/sec, 1 packets/sec
 5 minute output rate 0 bits/sec, 1 packets/sec
     5 packets input, 560 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     5 packets output, 560 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
```

Table 21 describes the fields shown in both the displays.

Table 21 show interfaces atm Field Descriptions

Field	Description
ATM... is {up | down| administratively down}	Indicates whether the interface hardware is currently active (whether carrier detect is present) and if it has been taken down by an administrator.
line protocol is {up | down | administratively down}	Indicates whether the software processes that handle the line protocol think the line is usable (that is, whether keepalives are successful).
Hardware is	Hardware type.
Internet address is	Internet address and subnet mask.
MTU	Maximum Transmission Unit of the interface.
sub MTU	Maximum Transmission Unit of the subinterface.
BW	Bandwidth of the interface in kilobits per second.
DLY	Delay of the interface in microseconds.
rely	Reliability of the interface as a fraction of 255 (255/255 is 100% reliability), calculated as an exponential average over 5 minutes.
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes. The calculation uses the value from the **bandwidth** interface configuration command.

Table 21 show interfaces atm Field Descriptions (continued)

Field	Description
ATM E164 Auto Conversion Interface	Indicates that ATM E164 auto conversion is enabled. When this field is not present, ATM E164 auto conversion is disabled.
Encapsulation	Encapsulation method assigned to interface.
loopback	Indicates whether the interface is configured for loopback testing.
keepalive	Indicates whether keepalives are set or not.
Encapsulation(s)	Type of encapsulation used on the interface (for example, AAL5, and either PVC or SVC mode).
TX buffers	Number of buffers configured with the **atm txbuff** command.
RX buffers	Number of buffers configured with the **atm rxbuff** command.
Maximum active VCs	Maximum number of virtual circuits.
VCs per VP	Number of virtual circuits per virtual path (the default is 1024).
Current VCs	Number of virtual circuit connections currently open.
VC idle disconnect time	Number of seconds the SVC must be idle before the SVC is disconnected.
Signalling vc	Number of the signaling PVC.
vpi	Virtual path identifier number.
vci	Virtual channel identifier number.
ATM NSAP address	NSAP address of the ATM interface.
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface. Useful for knowing when a dead interface failed.
Last output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface.
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.
Last clearing	The time at which the counters that measure cumulative statistics (such as number of bytes transmitted and received) shown in this report were last reset to zero. Note that variables that might affect routing (for example, load and reliability) are not cleared when the counters are cleared. *** indicates that the elapsed time is too large to be displayed. 0:00:00 indicates that the counters were cleared more than 2^{31}ms (and less than 2^{32}ms) ago.
Queueing strategy	First-in, first-out queueing strategy (other queueing strategies you might see are priority-list, custom-list, and weighted fair).
Output queue, drops input queue, drops	Number of packets in output and input queues. Each number is followed by a slash, the maximum size of the queue, and the number of packets dropped due to a full queue.
5 minute input rate, 5 minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes.
packets input	Total number of error-free packets received by the system.

Table 21 show interfaces atm Field Descriptions (continued)

Field	Description
bytes input	Total number of bytes, including data and MAC encapsulation, in the error free packets received by the system.
no buffer	Number of received packets discarded because there was no buffer space in the main system. Compare with ignored count. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.
Received broadcasts	Total number of broadcast or multicast packets received by the interface.
runts	Number of packets that are discarded because they are smaller than the medium's minimum packet size.
giants	Number of packets that are discarded because they exceed the medium's maximum packet size.
input errors	Total number of no buffer, runts, giants, CRCs, frame, overrun, ignored, and abort counts. Other input-related errors can also increment the count, so that this sum may not balance with the other counts.
CRC	Cyclic redundancy checksum generated by the originating LAN station or far-end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRCs is usually the result of collisions or a station transmitting bad data. On a serial link, CRCs usually indicate noise, gain hits or other transmission problems on the data link.
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets.
overrun	Number of times the serial receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.
ignored	Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. These buffers are different than the system buffers mentioned previously in the buffer description. Broadcast storms and bursts of noise can cause the ignored count to be incremented.
abort	Illegal sequence of one bits the interface. This usually indicates a clocking problem between the interface and the data link equipment.
packets output	Total number of messages transmitted by the system.
bytes	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
underruns	Number of times that the transmitter has been running faster than the router can handle. This may never be reported on some interfaces.
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this may not balance with the sum of the enumerated output errors, as some datagrams may have more than one error, and others may have errors that do not fall into any of the specifically tabulated categories.
collisions	This feature is not applicable for ATM interfaces.

Table 21 show interfaces atm Field Descriptions (continued)

Field	Description
interface resets	Number of times an interface has been completely reset. This can happen if packets queued for transmission were not sent within several seconds. On a serial line, this can be caused by a malfunctioning modem that is not supplying the transmit clock signal, or by a cable problem. If the system notices that the carrier detect line of a serial interface is up, but the line protocol is down, it periodically resets the interface in an effort to restart it. Interface resets can also occur when an interface is looped back or shut down.
output buffer failures	Number of times that a packet was not output from the output hold queue because of a shortage of MEMD shared memory.
output buffers swapped out	Number of packets stored in main memory when the output queue is full; swapping buffers to main memory prevents packets from being dropped when output is congested. The number is high when traffic is bursty.
restarts	Number of times the controller was restarted because of errors.

show lane bus

To display detailed LAN Emulation (LANE) information for the broadcast and unknown server (BUS) configured on an interface or any of its subinterfaces, on a specified subinterface, or on an emulated LAN (ELAN), use the **show lane bus** command in user EXEC or privileged EXEC mode.

AIP on the Cisco 7500 Series Routers; ATM Port Adapter on the Cisco 7200 Series

show lane bus [**interface atm** *slot/port*[**.***subinterface-number*] | **name** *elan-name*] [**brief**]

ATM Port Adapter on the Cisco 7500 Series Routers

show lane bus [**interface atm** *slot/port-adapter/port*[**.***subinterface-number*] | **name** *elan-name*] [**brief**]

Cisco 4500 and 4700 Routers

show lane bus [**interface atm** *number*[**.***subinterface-number*] | **name** *elan-name*] [**brief**]

Syntax Description

interface atm *slot/port*	(Optional) ATM interface slot and port for the following: • AIP on the Cisco 7500 series routers. • ATM port adapter on the Cisco 7200 series routers.
interface atm *slot/port-adapter/port*	(Optional) ATM interface slot, port adapter, and port number for the ATM port adapter on the Cisco 7500 series routers.
interface atm *number*	(Optional) ATM interface number for the NPM on the Cisco 4500 or 4700 routers.
.*subinterface-number*	(Optional) Subinterface number.
name *elan-name*	(Optional) Name of the ELAN. The maximum length of the name is 32 characters.
brief	(Optional) Displays the brief subset of available information.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.0	This command was introduced.

Examples

The following is sample output from the **show lane bus** command for an Ethernet ELAN:

```
Router# show lane bus

LE BUS ATM2/0.2  ELAN name: elan2  Admin: up  State: operational
type: ethernet         Max Frame Size: 1516
ATM address: 39.020304050607080910111213.00000CA05B42.02
data forward: vcd 61, 2 members, 0 packets, 0 unicasts

lecid  vcd     pkts   ATM Address
    1   58        0 39.020304050607080910111213.00000CA05B40.02
    2   82        0 39.020304050607080910111213.00602F557940.02
```

The following is sample output from the **show lane bus** command for a Token Ring LANE:

```
show lane bus

LE BUS ATM3/0.1  ELAN name: anubis  Admin: up  State: operational
type: token ring         Max Frame Size: 4544      Segment ID: 2500
ATM address: 47.009181000000000000000000.00000CA01662.01
data forward: vcd 14, 2 members, 0 packets, 0 unicasts

lecid  vcd     pkts   ATM Address
    1   11        0 47.009181000000000000000000.00000CA01660.01
    2   17        0 47.009181000000000000000000.00000CA04960.01
```

Table 22 describes significant fields shown in the display.

Table 22 show lane bus Field Descriptions

Field	Description
LE BUS ATM2/0.2	Interface and subinterface for which information is displayed.
ELAN name	Name of the ELAN for this BUS.
Admin	Administrative state, either up or down.
State	Status of this LANE BUS. Possible states include down and operational.
type	Type of ELAN.
Max Frame Size	Maximum frame size (in bytes) on the ELAN.
Segment ID	The ring number of the ELAN. This field appears only for Token Ring LANE.
ATM address	ATM address of this LANE BUS.
data forward	Virtual channel descriptor of the Data Forward VCC, the number of LANE clients attached to the VCC, and the number of packets sent on the VCC.
lecid	Identifier assigned to each LANE client on the Data Forward VCC.
vcd	Virtual channel descriptor used to reach the LANE client.
pkts	Number of packets sent by the BUS to the LANE client.
ATM Address	ATM address of the LANE client.

show lane client

To display detailed LAN Emulation (LANE) information for all the LANE clients configured on an interface or any of its subinterfaces, on a specified subinterface, or on an emulated LAN (ELAN), use the **show lane client** command in user EXEC or privileged EXEC mode.

AIP on the Cisco 7500 Series Routers; ATM Port Adapter on the Cisco 7200 Series

show lane client detail [**interface atm** *slot/port*[**.***subinterface-number*] | **name** *elan-name*] [**brief**]

ATM Port Adapter on the Cisco 7500 Series Routers

show lane client detail [**interface atm** *slot/port-adapter/port*[**.***subinterface-number*] | **name** *elan-name*] [**brief**]

Cisco 4500 and 4700 Routers

show lane client detail [**interface atm** *number*[**.***subinterface-number*] | **name** *elan-name*] [**brief**]

Syntax Description

detail	Displays additional FSSRP information.
interface atm *slot/port*	(Optional) ATM interface slot and port for the following: • AIP on the Cisco 7500 series routers. • ATM port adapter on the Cisco 7200 series routers.
interface atm *slot/port-adapter/port*	(Optional) ATM interface slot, port adapter, and port number for the ATM port adapter on the Cisco 7500 series routers.
interface atm *number*	(Optional) ATM interface number for the NPM on the Cisco 4500 or 4700 routers.
.*subinterface-number*	(Optional) Subinterface number.
name *elan-name*	(Optional) Name of ELAN. The maximum length of the name is 32 characters.
brief	(Optional) Displays the brief subset of available information.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.0	This command was introduced.
12.0(5)T	The **detail** option and command output line “This client is running in FSSRP mode” were added.

Examples

The following is sample output from the **show lane client** command for an Ethernet ELAN:

```
Router# show lane client

LE Client ATM2/0.2  ELAN name: elan2  Admin: up  State: operational
Client ID: 1                LEC up for 11 minutes 49 seconds
Join Attempt: 1
HW Address: 0000.0ca0.5b40   Type: ethernet             Max Frame Size: 1516

ATM Address: 39.020304050607080910111213.00000CA05B40.02

 VCD  rxFrames  txFrames  Type       ATM Address
   0         0         0  configure  39.020304050607080910111213.00000CA05B43.00
  55         1         4  direct     39.020304050607080910111213.00000CA05B41.02
  56         6         0  distribute 39.020304050607080910111213.00000CA05B41.02
  59         0         1  send       39.020304050607080910111213.00000CA05B42.02
  60         3         0  forward    39.020304050607080910111213.00000CA05B42.02
  84         3         5  data       39.020304050607080910111213.00602F557940.02
```

The following is sample output from the **show lane client** command for a Token Ring LANE:

```
Router# show lane client

LE Client ATM4/0.1  ELAN name: elan1  Admin: up  State: operational
Client ID: 1                LEC up for 2 hours 26 minutes 3 seconds
Join Attempt: 3
HW Address: 0060.4770.4180   Type: token ring           Max Frame Size: 4544
Ring:100    Bridge:2        ELAN Segment ID: 2048
ATM Address: 39.020304050607080910111213.006047704180.01

 VCD  rxFrames  txFrames  Type       ATM Address
   0         0         0  configure  39.020304050607080910111213.006047704183.00
  10         1         3  direct     39.020304050607080910111213.006047704181.01
  11         2         0  distribute 39.020304050607080910111213.006047704181.01
  14         0         0  send       39.020304050607080910111213.006047704182.01
  15         0         0  forward    39.020304050607080910111213.006047704182.01
```

The following is sample output from the **show lane client detail** command.

```
Router# show lane client detail

LE Client ATM1/0.1 ELAN name:xxx Admin:up State:operational
Client ID:2 LEC up for 5 days 40 minutes 45 seconds
ELAN ID:0
This client is running in FSSRP mode.
Join Attempt:14
Known LE Servers:1
Configured Idle Time:5 seconds
Last Fail Reason:Config VC being released
HW Address:00e0.8fcf.d820   Type:ethernet             Max Frame Size:1516

ATM Address:47.009181000000061705B0C01.00E08FCFD820.01
    VCD rxFramestxFramesTypeATM Address
    0   0   0   configure 47.00918100000000613E5A2F01.006070174823.00

LEC ID:2, State:LESBUS_ACTIVE

    52  17783556direct47.00918100000000613E5A2F01.00000C5A0C59.01
    53  17780   distribute47.00918100000000613E5A2F01.00000C5A0C59.01
    54  0   0   send47.00918100000000613E5A2F01.00000C5A0C5A.01
    55  0   0   forward47.00918100000000613E5A2F01.00000C5A0C5A.01

LEC ID:3, State:LESBUS_ACTIVE
```

```
93  122 234 direct47.00918100000000613E5A2F01.00000ABCD001.09
94  122 0   distribute47.00918100000000613E5A2F01.00000ABCD001.09
97  0   0   send47.00918100000000613E5A2F01.00000ABCD002.09
08  0   0   forward47.00918100000000613E5A2F01.00000ABCD002.09
```

Table 23 describes significant fields shown in the display.

Table 23 show lane client Field Descriptions

Field	Description
LE Client ATM2/0.2	Interface and subinterface of this client.
ELAN name	Name of the ELAN.
Admin	Administrative state, either up or down.
State	Status of this LANE client. Possible states include initialState, lecsConnect, configure, join, busConnect, and operational.
Client ID	The LANE 2-byte client ID assigned by the LANE server.
Join Attempt	The number of attempts made before successfully joining the ELAN.
HW Address	MAC address of this LANE client.
Type	Type of ELAN.
Max Frame Size	Maximum frame size (in bytes) on the ELAN.
Ring	The ring number for the client. This field appears only for Token Ring LANE.
Bridge	The bridge number for the client. This field appears only for Token Ring LANE.
ELAN Segment ID	The ring number for the ELAN. This field appears only for Token Ring LANE.
ATM Address	ATM address of this LANE client.
VCD	Virtual channel descriptor for each of the VCCs established for this LANE client.
rxFrames	Number of frames received.
txFrames	Number of frames sent.
Type	Type of VCC. The Configure Direct VCC is shown in this display as *configure*. The Control Direct VCC is shown as *direct*; the Control Distribute VCC is shown as *distribute*. The Multicast Send VCC and Multicast Forward VC are shown as *send* and *forward*, respectively. The Data Direct VCC is shown as *data*.
ATM Address	ATM address of the LANE component at the other end of this VCC.

Related Commands

Command	Description
lane client	Activates a LANE client on the specified subinterface.
lane fssrp	Enables the special LANE features so that LANE components (such as the LANE configuration server, the LANE client, the LANE server, and the BUS) become aware of FSSRP.

Command	Description
lane server	Activates a LANE server on the specified subinterface.
show lane config	Displays global LANE information for the configuration server configured on an interface.

show lane config

To display global LAN Emulation (LANE) information for the configuration server configured on an interface, use the **show lane config** command in user EXEC or privileged EXEC mode.

AIP on the Cisco 7500 Series Routers; ATM Port Adapter on the Cisco 7200 Series

show lane config [**interface atm** *slot*/**0**]

ATM Port Adapter on the Cisco 7500 Series Routers

show lane config [**interface atm** *slot/port-adapter*/**0**]

Cisco 4500 and 4700 Routers

show lane config [**interface atm** *number*]

Syntax Description

interface atm *slot*/**0**	(Optional) ATM interface slot and port for the following: • AIP on the Cisco 7500 series routers. • ATM port adapter on the Cisco 7200 series routers.
interface atm *slot/port-adapter*/**0**	(Optional) ATM interface slot, port adapter, and port number for the ATM port adapter on the Cisco 7500 series routers.
interface atm *number*	(Optional) ATM interface number for the NPM on the Cisco 4500 or 4700 routers.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.0	This command was introduced.

Examples

The following is sample **show lane config** output for an Ethernet ELAN:

```
Router# show lane config

LE Config Server ATM2/0 config table: cisco_eng
Admin: up  State: operational
LECS Mastership State: active master
list of global LECS addresses (30 seconds to update):
39.020304050607080910111213.00000CA05B43.00
ATM Address of this LECS: 39.020304050607080910111213.00000CA05B43.00 (auto)
 vcd  rxCnt  txCnt  callingParty
  50      2      2  39.020304050607080910111213.00000CA05B41.02 LES elan2 0 active
cumulative total number of unrecognized packets received so far: 0
cumulative total number of config requests received so far: 30
```

```
cumulative total number of config failures so far: 12
    cause of last failure: no configuration
    culprit for the last failure: 39.020304050607080910111213.00602F557940.01
```

The following example shows sample **show lane config** output for TR-LANE:

```
Router# show lane config

LE Config Server ATM4/0 config table: eng
Admin: up  State: operational
LECS Mastership State: active master
list of global LECS addresses (40 seconds to update):
39.020304050607080910111213.006047704183.00
ATM Address of this LECS: 39.020304050607080910111213.006047704183.00 (auto)
 vcd  rxCnt  txCnt  callingParty
   7      1      1  39.020304050607080910111213.006047704181.01 LES elan1 0 active
cumulative total number of unrecognized packets received so far: 0
cumulative total number of config requests received so far: 2
cumulative total number of config failures so far: 0
```

Table 24 describes significant fields shown in the display.

Table 24 show lane config Field Descriptions

Field	Description
LE Config Server	Major interface on which the LAN emulated Configuration Server (LECS) is configured.
config table	Name of the database associated with the LECS.
Admin	Administrative state, either up or down.
State	State of the configuration server: down or operational. If down, the reasons field indicates why it is down. The reasons include the following: NO-config-table, NO-nsap-address, and NO-interface-up.
LECS Mastership State	Mastership state of the configuration server. If you have configured simple server redundancy, the configuration server with the lowest index is the active LECS.
list of global LECS addresses	List of LECS addresses.
40 seconds to update	Amount of time until the next update.
39.020304050607080910111213.00000CA05B43.00	ATM address of the configuration server.
ATM Address of this LECS	ATM address of the active configuration server.
auto	Method of ATM address assignment for the configuration server. In this example, the address is assigned by the automatic method.
vcd	Virtual circuit descriptor that uniquely identifies the configure VCC.
rxCnt	Number of packets received.
txCnt	Number of packets sent.
callingParty	ATM NSAP address of the LANE component that is connected to the LECS. “elan1” indicates the ELAN name, “0” indicates the priority number, and “active” indicates that the server is active.

show lane database

To display the database of the configuration server, use the **show lane database** command in user EXEC or privileged EXEC mode.

show lane database [*database-name*]

Syntax Description

database-name	(Optional) Specific database name.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

By default, this command displays the LAN Emulated Configuration Server information displayed by the **show lane config** command.

If no database name is specified, this command shows all databases.

Examples

The following is sample output of the **show lane database** command for an Ethernet LANE:

```
Router# show lane database

LANE Config Server database table 'engandmkt' bound to interface/s: ATM1/0
default elan: none
elan ‘eng’: restricted
  server 45.000001415555121f.yyyy.zzzz.0800.200c.1001.01 (prio 0) active
  LEC MAC  0800.200c.1100
  LEC NSAP 45.000001415555121f.yyyy.zzzz.0800.200c.1000.01
  LEC NSAP 45.000001415555124f.yyyy.zzzz.0800.200c.1300.01
elan ‘mkt’:
  server 45.000001415555121f.yyyy.zzzz.0800.200c.1001.02 (prio 0) active
  LEC MAC  0800.200c.1200
  LEC NSAP 45.000001415555121f.yyyy.zzzz.0800.200c.1000.02
  LEC NSAP 45.000001415555124f.yyyy.zzzz.0800.200c.1300.02
```

The following is sample output of the **show lane database** command for a Token Ring LANE:

```
Router# show lane database

LANE Config Server database table 'eng' bound to interface/s: ATM4/0
default elan: elan1
elan 'elan1': un-restricted, local-segment-id 2048
  server 39.020304050607080910111213.006047704181.01 (prio 0) active
```

Table 25 describes significant fields shown in the display.

Table 25 show lane database Field Descriptions

Field	Description
LANE Config Server database	Name of this database and interfaces bound to it.
default elan	Default name, if one is established.
elan	Name of the ELAN whose data is reported in this line and the following indented lines.
un-restricted	Indicates whether this ELAN is restricted or unrestricted.
local-segment-id 2048	Ring number of the ELAN.
server	ATM address of the configuration server.
(prio 0) active	Priority level and simple server redundancy state of this configuration server. If you have configured simple server redundancy, the configuration server with the lowest priority will be active.
LEC MAC	MAC addresses of an individual LANE client in this ELAN. This display includes a separate line for every LANE client in this ELAN.
LEC NSAP	ATM addresses of all LANE clients in this ELAN.

show lane default-atm-addresses

To display the automatically assigned ATM address of each LANE component in a router or on a specified interface or subinterface, use the **show lane default-atm-addresses** command in user EXEC or privileged EXEC mode.

AIP on the Cisco 7500 series routers; ATM port adapter on the Cisco 7200 series

show lane default-atm-addresses [**interface atm** *slot/port.subinterface-number*]

ATM Port Adapter on the Cisco 7500 Series Routers

show lane default-atm-addresses [**interface atm** *slot/port-adapter/port.subinterface-number*]

Cisco 4500 and 4700 Routers

show lane default-atm-addresses [**interface atm** *number.subinterface-number*]

Syntax Description

interface atm *slot/port*	(Optional) ATM interface slot and port for the following: • AIP on the Cisco 7500 series routers. • ATM port adapter on the Cisco 7200 series routers.
interface atm *slot/port-adapter/port*	(Optional) ATM interface slot, port adapter, and port number for the ATM port adapter on the Cisco 7500 series routers.
interface atm *number*	(Optional) ATM interface number for the NPM on the Cisco 4500 or 4700 routers.
.subinterface-number	(Optional) Subinterface number.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.0	This command was introduced.
11.1	The *number.subinterface-number* argument was added.

Usage Guidelines

It is not necessary to have any of the LANE components running on this router before you use this command.

Examples

The following is sample output of the **show lane default-atm-addresses** command for the ATM interface 1/0 when all the major LANE components are located on that interface:

```
Router# show lane default-atm-addresses interface atm1/0

interface ATM1/0:
LANE Client:        47.00000000000000000000000.00000C304A98.**
LANE Server:        47.00000000000000000000000.00000C304A99.**
LANE Bus:           47.00000000000000000000000.00000C304A9A.**
LANE Config Server: 47.00000000000000000000000.00000C304A9B.00
note: ** is the subinterface number byte in hex
```

Table 26 describes the significant fields shown in the display.

Table 26 show lane default-atm-addresses Field Descriptions

Field	Description
interface ATM1/0:	Specified interface.
LANE Client:	ATM address of the LANE client on the interface.
LANE Server:	ATM address of the LANE server on the interface.
LANE Bus:	ATM address of the LANE broadcast and unknown server on the interface.
LANE Config Server:	ATM address of the LAN Emulated Configuration Server on the interface.

show lane le-arp

To display the LANE ARP table of the LANE client configured on an interface or any of its subinterfaces, on a specified subinterface, or on an emulated LAN (ELAN), use the **show lane le-arp** command in user EXEC or privileged EXEC mode.

AIP on the Cisco 7500 series routers; ATM Port Adapter on the Cisco 7200 series

show lane le-arp [**interface atm** *slot/port*[**.***subinterface-number*] | **name** *elan-name*]

ATM Port Adapter on the Cisco 7500 Series Routers

show lane le-arp [**interface atm** *slot/port-adapter/port*[**.***subinterface-number*] | **name** *elan-name*]

Cisco 4500 and 4700 Routers

show lane le-arp [**interface atm** *number*[**.***subinterface-number*] | **name** *elan-name*]

Syntax Description

interface atm *slot/port*	(Optional) ATM interface slot and port for the following: • AIP on the Cisco 7500 series routers. • ATM port adapter on the Cisco 7200 series routers.
interface atm *slot/port-adapter/port*	(Optional) ATM interface slot, port adapter, and port number for the ATM port adapter on the Cisco 7500 series routers.
interface atm *number*	(Optional) ATM interface number for the NPM on the Cisco 4500 or 4700 routers.
.subinterface-number	(Optional) Subinterface number.
name *elan-name*	(Optional) Name of the ELAN. The maximum length of the name is 32 characters.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.0	This command was introduced.

Examples

The following is sample output of the **show lane le-arp** command for an Ethernet LANE client:

```
Router# show lane le-arp

Hardware Addr   ATM Address                                  VCD  Interface
0000.0c15.a2b5  39.000000000000000000000000.00000C15A2B5.01  39  ATM1/0.1
0000.0c15.f3e5  39.000000000000000000000000.00000C15F3E5.01  25* ATM1/0.1
```

The following is sample output of the **show lane le-arp** command for a Token Ring LANE client:

```
Router# show lane le-arp

Ring Bridge       ATM Address                                     VCD  Interface
512   6           39.020304050607080910111213.00602F557940.01  47  ATM2/0.1
```

Table 27 describes the significant fields shown in the display.

Table 27 show lane le-arp Field Descriptions

Field	Description
Hardware Addr	MAC address, in dotted hexadecimal notation, assigned to the LANE component at the other end of this VCD.
Ring	Route descriptor segment number for the LANE component.
Bridge	Bridge number for the LANE component.
ATM Address	ATM address of the LANE component at the other end of this VCD.
VCD	Virtual circuit descriptor.
Interface	Interface or subinterface used to reach the specified component.

show lane server

To display global information for the LANE server configured on an interface, on any of its subinterfaces, on a specified subinterface, or on an emulated LAN (ELAN), use the **show lane server** command in user EXEC or privileged EXEC mode.

AIP on the Cisco 7500 Series Routers; ATM Port Adapter on the Cisco 7200 Series

show lane server [**interface atm** *slot/port*[**.***subinterface-number*] | **name** *elan-name*] [**brief**]

ATM Port Adapter on the Cisco 7500 Series Routers

show lane server [**interface atm** *slot/port-adapter/port*[**.***subinterface-number*] | **name** *elan-name*] [**brief**]

Cisco 4500 and 4700 Routers

show lane server [**interface atm** *number*[**.***subinterface-number*] | **name** *elan-name*] [**brief**]

Syntax Description

interface atm *slot/port*	(Optional) ATM interface slot and port for the following: • AIP on the Cisco 7500 series routers. • ATM port adapter on the Cisco 7200 series routers.
interface atm *slot/port-adapter/port*	(Optional) ATM interface slot, port adapter, and port number for the ATM port adapter on the Cisco 7500 series routers.
interface atm *number*	(Optional) ATM interface number for the NPM on the Cisco 4500 or 4700 routers.
.*subinterface-number*	(Optional) Subinterface number.
name *elan-name*	(Optional) Name of the ELAN. The maximum length of the name is 32 characters.
brief	(Optional) Keyword used to display the brief subset of available information.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.0	This command was introduced.

Examples

The following is sample output from the **show lane server** command for an Ethernet ELAN:

```
Router# show lane server

LE Server ATM2/0.2  ELAN name: elan2  Admin: up  State: operational
type: ethernet         Max Frame Size: 1516
```

```
ATM address: 39.020304050607080910111213.00000CA05B41.02
LECS used: 39.020304050607080910111213.00000CA05B43.00 connected, vcd 51
control distribute: vcd 57, 2 members, 2 packets

proxy/ (ST: Init, Conn, Waiting, Adding, Joined, Operational, Reject, Term)
lecid ST vcd    pkts Hardware Addr  ATM Address
   1  O   54       2 0000.0ca0.5b40 39.020304050607080910111213.00000CA05B40.02
   2  O   81       2 0060.2f55.7940 39.020304050607080910111213.00602F557940.02
```

The following is sample output from the **show lane server** command for a Token Ring ELAN:

```
Router# show lane server

LE Server ATM3/0.1  ELAN name: anubis  Admin: up  State: operational
type: token ring         Max Frame Size: 4544      Segment ID: 2500
ATM address: 47.009181000000000000000000.00000CA01661.01
LECS used: 47.009181000000000000000000.00000CA01663.00 connected, vcd 6
control distribute: vcd 10, 2 members, 4 packets
proxy/ (ST: Init, Conn, Waiting, Adding, Joined, Operational, Reject, Term)
lecid ST vcd    pkts Hardware Addr  ATM Address
   1  O    7       3 400.1         47.009181000000000000000000.00000CA01660.01
                     0000.0ca0.1660 47.009181000000000000000000.00000CA01660.01
   2  O   16       3 300.1         47.009181000000000000000000.00000CA04960.01
                     0000.0ca0.4960 47.009181000000000000000000.00000CA04960.01
```

Table 28 describes the significant fields shown in the display.

Table 28 show lane server Field Descriptions

Field	Description
LE Server ATM2/0.2	Interface and subinterface of this server.
ELAN name	Name of the ELAN.
Admin	Administrative state, either up or down.
State	Status of this LANE server. Possible states for a LANE server include down, waiting_ILMI, waiting_listen, up_not_registered, operational, and terminating.
type	Type of ELAN.
Max Frame Size	Maximum frame size (in bytes) of this type of emulated LAN.
Segment ID	The ring number of the ELAN. This field appears only for Token Ring LANE.
ATM address	ATM address of this LANE server.
LECS used	ATM address of the LANE configuration server being used. This line also shows the current state of the connection between the LANE server and the LAN Emulated Configuration Server (LECS), and the virtual circuit descriptor (VCD) of the circuit connecting them.
control distribute	VCD of the Control Distribute VCC.
proxy	Status of the LANE client at the other end of the Control Distribute VCC.
lecid	Identifier for the LANE client at the other end of the Control Distribute VCC.

Table 28 show lane server Field Descriptions (continued)

Field	Description
ST	Status of the LANE client at the other end of the Control Distribute VCC. Possible states are Init, Conn, Waiting, Adding, Joined, Operational, Reject, and Term.
vcd	Virtual channel descriptor used to reach the LANE client.
pkts	Number of packets sent by the LANE server on the Control Distribute VCC to the LANE client.
Hardware Addr	The top number in this column is the router descriptor, and the second number is the MAC-layer address of the LANE client.
ATM Address	ATM address of the LANE client.

show lane

To display detailed information for all the LAN Emulation (LANE) components configured on an interface or any of its subinterfaces, on a specified subinterface, or on an emulated LAN (ELAN), use the **show lane** command in user EXEC or privileged EXEC mode.

AIP on the Cisco 7500 Series Routers; ATM Port Adapter on the Cisco 7200 Series

show lane [**interface atm** *slot/port*[**.***subinterface-number*] | **name** *elan-name*] [**brief**]

ATM Port Adapter on the Cisco 7500 Series Routers

show lane [**interface atm** *slot/port-adapter/port*[**.***subinterface-number*] | **name** *elan-name*] [**brief**]

Cisco 4500 and 4700 Routers

show lane [**interface atm** *number*[**.***subinterface-number*] | **name** *elan-name*] [**brief**]

Syntax Description

interface atm *slot/port*	(Optional) ATM interface slot and port for the following: • AIP on the Cisco 7500 series routers. • ATM port adapter on the Cisco 7200 series routers.
interface atm *slot/port-adapter/port*	(Optional) ATM interface slot, port adapter, and port number for the ATM port adapter on the Cisco 7500 series routers.
interface atm *number*	(Optional) ATM interface number for the NPM on the Cisco 4500 or 4700 routers.
.*subinterface-number*	(Optional) Subinterface number.
name *elan-name*	(Optional) Name of the ELAN. The maximum length of the name is 32 characters.
brief	(Optional) Keyword used to display the brief subset of available information.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

Using the **show lane** command is equivalent to using the **show lane config**, **show lane server**, **show lane bus**, and **show lane client** commands. The **show lane** command shows all LANE-related information except the **show lane database** command information.

Examples

The following is sample output from the **show lane** command for an Ethernet ELAN:

```
Router# show lane

LE Config Server ATM2/0 config table: cisco_eng
Admin: up  State: operational
LECS Mastership State: active master
list of global LECS addresses (30 seconds to update):
39.020304050607080910111213.00000CA05B43.00  <-------- me
ATM Address of this LECS: 39.020304050607080910111213.00000CA05B43.00 (auto)
 vcd  rxCnt txCnt  callingParty
  50      2      2  39.020304050607080910111213.00000CA05B41.02 LES elan2 0 active
cumulative total number of unrecognized packets received so far: 0
cumulative total number of config requests received so far: 30
cumulative total number of config failures so far: 12
    cause of last failure: no configuration
    culprit for the last failure: 39.020304050607080910111213.00602F557940.01

LE Server ATM2/0.2  ELAN name: elan2  Admin: up  State: operational
type: ethernet         Max Frame Size: 1516
ATM address: 39.020304050607080910111213.00000CA05B41.02
LECS used: 39.020304050607080910111213.00000CA05B43.00 connected, vcd 51
control distribute: vcd 57, 2 members, 2 packets

proxy/ (ST: Init, Conn, Waiting, Adding, Joined, Operational, Reject, Term)
lecid ST vcd    pkts Hardware Addr  ATM Address
   1  O   54       2 0000.0ca0.5b40 39.020304050607080910111213.00000CA05B40.02
   2  O   81       2 0060.2f55.7940 39.020304050607080910111213.00602F557940.02

LE BUS ATM2/0.2  ELAN name: elan2  Admin: up  State: operational
type: ethernet         Max Frame Size: 1516
ATM address: 39.020304050607080910111213.00000CA05B42.02
data forward: vcd 61, 2 members, 0 packets, 0 unicasts

lecid  vcd     pkts   ATM Address
    1   58        0 39.020304050607080910111213.00000CA05B40.02
    2   82        0 39.020304050607080910111213.00602F557940.02

LE Client ATM2/0.2  ELAN name: elan2  Admin: up  State: operational
Client ID: 1                LEC up for 11 minutes 49 seconds
Join Attempt: 1
HW Address: 0000.0ca0.5b40   Type: ethernet             Max Frame Size: 1516

ATM Address: 39.020304050607080910111213.00000CA05B40.02

 VCD  rxFrames  txFrames  Type       ATM Address
   0         0         0  configure  39.020304050607080910111213.00000CA05B43.00
  55         1         4  direct     39.020304050607080910111213.00000CA05B41.02
  56         6         0  distribute 39.020304050607080910111213.00000CA05B41.02
  59         0         1  send       39.020304050607080910111213.00000CA05B42.02
  60         3         0  forward    39.020304050607080910111213.00000CA05B42.02
  84         3         5  data       39.020304050607080910111213.00602F557940.02
```

The following is sample output from the **show lane** command for a Token Ring LANE network:

```
Router# show lane

LE Config Server ATM4/0 config table: eng
Admin: up  State: operational
LECS Mastership State: active master
list of global LECS addresses (35 seconds to update):
39.020304050607080910111213.006047704183.00
ATM Address of this LECS: 39.020304050607080910111213.006047704183.00 (auto)
 vcd  rxCnt  txCnt  callingParty
```

```
   7      1      1  39.020304050607080910111213.006047704181.01 LES elan1 0 active
cumulative total number of unrecognized packets received so far: 0
cumulative total number of config requests received so far: 2
cumulative total number of config failures so far: 0

LE Server ATM4/0.1  ELAN name: elan1  Admin: up  State: operational
type: token ring         Max Frame Size: 4544      Segment ID: 2048
ATM address: 39.020304050607080910111213.006047704181.01
LECS used: 39.020304050607080910111213.006047704183.00 connected, vcd 9
control distribute: vcd 12, 1 members, 2 packets

proxy/ (ST: Init, Conn, Waiting, Adding, Joined, Operational, Reject, Term)
lecid ST vcd    pkts Hardware Addr  ATM Address
   1  O    8       3 100.2         39.020304050607080910111213.006047704180.01
                     0060.4770.4180 39.020304050607080910111213.006047704180.01

LE BUS ATM4/0.1  ELAN name: elan1  Admin: up  State: operational
type: token ring         Max Frame Size: 4544      Segment ID: 2048
ATM address: 39.020304050607080910111213.006047704182.01
data forward: vcd 16, 1 members, 0 packets, 0 unicasts

lecid  vcd     pkts   ATM Address
    1   13        0 39.020304050607080910111213.006047704180.01

LE Client ATM4/0.1  ELAN name: elan1  Admin: up  State: operational
Client ID: 1                LEC up for 2 hours 25 minutes 39 seconds
Join Attempt: 3
HW Address: 0060.4770.4180   Type: token ring           Max Frame Size: 4544
Ring:100    Bridge:2        ELAN Segment ID: 2048
ATM Address: 39.020304050607080910111213.006047704180.01

 VCD  rxFrames  txFrames  Type       ATM Address
   0         0         0  configure  39.020304050607080910111213.006047704183.00
  10         1         3  direct     39.020304050607080910111213.006047704181.01
  11         2         0  distribute 39.020304050607080910111213.006047704181.01
  14         0         0  send       39.020304050607080910111213.006047704182.01
  15         0         0  forward    39.020304050607080910111213.006047704182.01
```

Table 29 describes significant fields shown in the display.

Table 29 show lane Field Descriptions

Field	Description
LE Config Server	Identifies the following lines as applying to the LANE configuration server. These lines are also displayed in output from the **show lane config** command. See the **show lane config** command for explanations of the output.
LE Server	Identifies the following lines as applying to the LANE server. These lines are also displayed in output from the **show lane server** command. See the **show lane server** command for explanations of the output.
LE BUS	Identifies the following lines as applying to the LANE broadcast and unknown server. These lines are also displayed in output from the **show lane bus** command. See the **show lane bus** command for explanations of the output.
LE Client	Identifies the following lines as applying to a LANE client. These lines are also displayed in output from the **show lane client** command. See the **show lane bus** command for explanations of the output.

show mpoa client cache

To display the ingress or egress cache entries matching the IP addresses for the Multiprotocol over ATM (MPOA) clients (MPCs), use the **show mpoa client cache** command in user EXEC or privileged EXEC mode.

show mpoa client [**name** *mpc-name*] **cache** [**ingress** | **egress**] [**ip-address** *ip-address*]

Syntax Description

name *mpc-name*	(Optional) Name of the MPC with the specified name.
ingress	(Optional) Displays ingress cache entries associated with an MPC.
egress	(Optional) Displays egress cache entries associated with an MPC.
ip-address *ip-address*	(Optional) Displays cache entries that match the specified IP address.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Examples

The following is sample output from the **show mpoa client cache** command for a specific MPC:

```
Router# show mpoa client ip_mpc cache

MPC Name: ip-mpc, Interface: ATM1/0, State: Up
MPC actual operating address: 47.00918100000000613E5A2F01.0010A6943825.00
Shortcut-Setup Count: 1, Shortcut-Setup Time: 1
Number of Ingress cache entries: 1
MPC Ingress Cache Information:
Dst IP addr     State   vcd Expires Egress MPC Atm address
20.20.20.1      RSVLD    35   11:38 47.00918100000000613E5A2F01.00000C5A0C5D.00
Number of Egress cache entries: 1
MPC Egress Cache Information:
Dst IP addr         Dst MAC       Src MAC     MPSid  Elan Expires  CacheId  Tag
10.10.10.1      0000.0c5a.0c58 0060.7017.4820     9     2   11:55        1    1
```

Table 30 describes the significant fields shown in the display.

Table 30 show mpoa client cache Field Descriptions

Field	Description
MPC Name	Name specified for the MPC.
Interface	Interface to which the MPC is attached.
State	Current state of the MPC (up or down).
MPC actual operating address	ATM address of the MPC.
Shortcut-Setup Count	Current number specified by the **shortcut-frame-count** command.

Table 30 show mpoa client cache Field Descriptions (continued)

Field	Description
Number of Ingress cache entries	Number of entries in the ingress cache.
MPC Ingress Cache Information	
Dst IP addr	IP address of the destination.
State	State of the ingress cache entry. (Valid states are initialized, trigger, refresh, hold-down, resolved, and suspended.)
vcd	Number that identifies the virtual circuit.
Expires	Time in minutes or seconds until the ingress cache entry expires.
Egress MPC Atm address	ATM address of the egress MPC.
Number of Egress cache entries	Number of entries in the egress cache.
MPC Egress Cache Information	
Dst IP addr	IP address of the destination.
Dst MAC	MAC address of the destination.
Src MAC	MAC address of the source.
MPSid	Unique number representing the egress MPS.
Elan	ELAN identifier of the ELAN serving this destination IP address.
Expires	Time in minutes or seconds until the egress cache entry expires.
CacheID	Cache identifier.
Tag	Label (tag) identifier.

show mpoa client statistics

To display all the statistics collected by a Multiprotocol over ATM (MPOA) client (MPC), use the **show mpoa client statistics** command in user EXEC or privileged EXEC mode.

show mpoa client [**name** *mpc-name*] **statistics**

Syntax Description

name *mpc-name*	(Optional) Specifies the name of the MPC.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Usage Guidelines

This command displays all the statistics collected by an MPC.

Examples

The following is sample output from the **show mpoa client statistics** command for the MPC named ip_mpc:

```
Router# show mpoa client name ip_mpc statistics

MPC Name: ip_mpc, Interface: ATM1/0, State: Up
MPC actual operating address: 47.00918100000000613E5A2F01.0010A6943825.00
Shortcut-Setup Count: 1, Shortcut-Setup Time: 1

                            Transmitted       Received
MPOA Resolution Requests              2              0
MPOA Resolution Replies               0              2
MPOA Cache Imposition Requests        0              0
MPOA Cache Imposition Replies         0              0
MPOA Cache Purge Requests             0              0
MPOA Cache Purge Replies              0              0
MPOA Trigger Request                  0              0
NHRP Purge Requests                   0              0


Invalid MPOA Data Packets Received: 0
```

show mpoa client

To display a summary of information regarding one or all Multiprotocol over ATM (MPOA) clients (MPCs), use the **show mpoa client** command in user EXEC or privileged EXEC mode.

show mpoa client [**name** *mpc-name*] [**brief**]

Syntax Description

name *mpc-name*	(Optional) Name of the MPC with the specified name.
brief	(Optional) Output limit of the command.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Usage Guidelines

If you omit the **name** keyword, the command displays information for all MPCs.

Examples

The following is sample output from the **show mpoa client** command:

```
Router# show mpoa client name ip_mpc brief

MPC Name: ip_mpc, Interface: ATM1/0, State: Up
MPC actual operating address: 47.00918100000000613E5A2F01.0010A6943825.00
Shortcut-Setup Count: 1, Shortcut-Setup Time: 1
Lane clients bound to MPC ip_mpc: ATM1/0.1
Discovered MPS neighbors                    kp-alv   vcd     rxPkts     txPkts
47.00918100000000613E5A2F01.006070174824.00     59    30         28          2
Remote Devices known                                    vcd     rxPkts     txPkts
47.00918100000000613E5A2F01.00000C5A0C5D.00              35          0         10
```

Table 31 describes the significant fields shown in the display.

Table 31 show mpoa client Field Descriptions

Field	Description
MPC Name	Name specified for the MPC.
Interface	Interface to which the MPC is attached.
State	Current state of the MPC.
MPC actual operating address	ATM address of the MPC.
Shortcut-Setup Count	Current number specified by the **shortcut-frame-count** command.
Shortcut-Setup Time	Current value specified by the **shortcut-frame-time** command.

Table 31 show mpoa client Field Descriptions (continued)

Field	Description
Lane clients bound to MPC ip_mpc	List of LANE clients currently bound to MPC ip_mpc.
Discovered MPS neighbours	List of learned MPS addresses.
kp-alv	Number of seconds until the next keepalive message should be received.
vcd	Number that identifies the virtual circuit.
rxPkts	Number of packets received from the learned MPS.
txPkts	Number of packets sent to the learned MPS.
Remote Devices known	List of other devices (typically other MPCs) not in this ELAN.
vcd	Number that identifies the virtual circuit to that MPC.
rxPkts	Number of packets received from the learned remote device.
txPkts	Number of packets sent to the learned remote device.

Related Commands

Command	Description
clear mpoa client name	Clears the ingress and egress cache entries.

show mpoa default-atm-addresses

To display the default ATM addresses for the Multiprotocol over ATM (MPOA) client (MPC), use the **show mpoa default-atm-addresses** command in user EXEC or privileged EXEC mode.

show mpoa default-atm-addresses

Syntax Description

This command has no arguments or keywords.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Examples

The following is sample output from the **show mpoa default-atm-addresses** command when the switch prefix is not available:

```
Router# show mpoa default-atm-addresses

interface ATM1/0:
MPOA Server: ...006070174824.**
MPOA Client: ...006070174825.**
note: ** is the MPS/MPC instance number in hex

interface ATM2/0:
MPOA Server: ...006070174844.**
MPOA Client: ...006070174845.**
note: ** is the MPS/MPC instance number in hex
```

The following is sample output from the **show mpoa default-atm-addresses** command when the switch prefix is available:

```
Router# show mpoa default-atm-addresses

interface ATM1/0:
MPOA Server: 47.00918100000000613E5A2F01.006070174824.**
MPOA Client: 47.00918100000000613E5A2F01.006070174825.**
note: ** is the MPS/MPC instance number in hex

interface ATM2/0:
MPOA Server: 47.10000000000000000000000.006070174844.**
MPOA Client: 47.10000000000000000000000.006070174845.**
note: ** is the MPS/MPC instance number in hex
```

Table 32 describes the significant fields shown in the display.

Table 32 show mpoa default-atm-addresses Field Descriptions

Field	Description
interface ATM1/0	Specified interface.
MPOA Server	ATM address of the MPOA server on the interface.
MPOA Client	ATM address of the MPOA client on the interface.

show mpoa server cache

To display ingress and egress cache entries associated with an Multiprotocol over ATM (MPOA) server (MPS), use the **show mpoa server cache** command in user EXEC or privileged EXEC mode.

show mpoa server [**name** *mps-name*] **cache** [**ingress** | **egress**] [**ip-address** *ip-address*]

Syntax Description

name *mps-name*	(Optional) Specifies the name of an MPS.
ingress	(Optional) Displays ingress cache entries associated with a server.
egress	(Optional) Displays egress cache entries associated with a server.
ip-address *ip-address*	(Optional) Displays the entries that match the specified IP address.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
12.0	This command was introduced.

Usage Guidelines

This command displays ingress and egress cache entries associated with an MPS.

Examples

The following is sample output from the **show mpoa server cache** command, with a name specified:

```
Router# show mpoa server name ip_mps cache

MPS Name: ip_mps, MPS id: 0, Interface: ATM1/0, State: up
network-id: 1, Keepalive: 25 secs, Holding time: 1200 secs
Keepalive lifetime: 75 secs, Giveup time: 40 secs
MPS actual operating address: 47.00918100000000613E5A2F01.006070174824.00
Number of Ingress cache entries: 1
Ingress Cache information:
  IP address      Ingress MPC ATM Address                      Remaining Time
  20.20.20.1      47.00918100000000613E5A2F01.0010A6943825.00  19:07
Number of Egress cache entries: 1
Egress Cache information:
  Dst IP address  Ingress MPC ATM Address                      Remaining Time
  20.20.20.1      47.00918100000000613E5A2F01.0010A6943825.00  19:06
         src IP 20.20.20.2, cache Id 1
```

Table 33 describes the significant fields shown in the display.

Table 33 show mpoa server cache Field Descriptions

Field	Description
MPS Name	Name of the MPOA server.
MPS id	ID of the MPOA server.
Interface	Interface to which the MPS is attached.

Table 33 show mpoa server cache Field Descriptions (continued)

Field	Description
State	State of the MPOA server: up or down.
network-id	Network ID used for partitioning.
Keepalive	Keepalive time value.
Holding time	Holding time value.
Keepalive lifetime	Keepalive lifetime value.
Giveup time	Minimum time to wait before giving up on a pending resolution request.
MPS actual operating address	Actual control address of this MPS.
Number of Ingress cache entries	Number of entries in the ingress cache.
Ingress Cache information	Information of ingress cache.
IP address	IP address of the MPC.
Ingress MPC ATM Address	ATM address of the ingress MPC.
Remaining Time	Time for which the cache entry is valid.
Number of Egress cache entries	Number of entries in the egress cache.
Egress Cache information	Information of egress cache.
Dst IP address	IP address of the destination.
src IP	IP address of the source MPS that originated the NHRP resolution request.
cache Id	Cache identifier.

show mpoa server statistics

To display all the statistics collected by an Multiprotocol over ATM (MPOA) server (MPS), use the **show mpoa server statistics** command in user EXEC or privileged EXEC mode.

show mpoa server [**name** *mps-name*] **statistics**

Syntax Description

name *mps-name*	(Optional) Specifies the name of an MPS.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
12.0	This command was introduced.

Usage Guidelines

This command will display all the statistics collected by an MPS. The statistics pertain to the ingress or egress cache entry creation, deletion, and failures.

Examples

The following is a sample output from the **show mpoa server statistics** command, with a name specified:

```
Router# show mpoa server name ip_mps statistics

MPS Name: ip_mps, MPS id: 0, Interface: ATM1/0, State: up
network-id: 1, Keepalive: 25 secs, Holding time: 1200 secs
Keepalive lifetime: 75 secs, Giveup time: 40 secs
MPS actual operating address: 47.00918100000000613E5A2F01.006070174824.00
Opcode                          Transmitted    Received
-----------------------------------------------------------
MPOA Resolution Requests                              2
MPOA Resolution Replies                    2
MPOA Cache Imposition Requests             1
MPOA Cache Imposition Replies                         1
MPOA Egress Cache Purge Requests                      0
MPOA Egress Cache Purge Replies            0
NHRP Resolution Requests                   0          0
NHRP Resolution Replies                    0          0
NHRP Purge Requests                        0          0
```

Table 34 describes the significant fields shown in the display.

Table 34 show mpoa server statistics Field Descriptions

Field	Description
MPS Name	Name of the MPOA server.
MPS id	ID of the MPOA server.
Interface	Specified interface.

Table 34 show mpoa server statistics Field Descriptions (continued)

Field	Description
State	State of the MPOA server: up or down.
network-id	Network ID used for partitioning.
Keepalive	Keepalive time value.
Holding time	Holding time value.
Keepalive lifetime	Keepalive lifetime value.
Giveup time	Minimum time to wait before giving up on a pending resolution request.
MPS actual operating address	Actual control address of this MPS.

show mpoa server

To display information about any specified Multiprotocol over ATM (MPOA) server (MPS) or all MPSs in the system, depending on whether the name of the required MPS is specified, use the **show mpoa server** command in user EXEC or privileged EXEC mode.

show mpoa server [**name** *mps-name*]

Syntax Description

name *mps-name*	(Optional) Specifies the name of the MPS.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.3(3a)WA4(5)	This command was introduced.

Usage Guidelines

The command displays information about server configuration parameters. It also displays information about LAN Emulated Clients (LECs) that are bound to the MPOA server neighbors (both MPC and MPS).

Examples

The following is sample output from the **show mpoa server** command, with a specified name:

```
Router# show mpoa server name ip_mps

MPS Name: ip_mps, MPS id: 0, Interface: ATM1/0, State: up
network-id: 1, Keepalive: 25 secs, Holding time: 1200 secs
Keepalive lifetime: 75 secs, Giveup time: 40 secs
MPS actual operating address: 47.00918100000000613E5A2F01.006070174824.00
Lane clients bound to MPS ip_mps: ATM1/0.1 ATM1/0.2
Discovered neighbours:
MPC 47.00918100000000613E5A2F01.00000C5A0C5D.00 vcds: 39(R,A)
MPC 47.00918100000000613E5A2F01.0010A6943825.00 vcds: 40(R,A)
```

Table 35 describes the significant fields shown in the display.

Table 35 show mpoa server Field Descriptions

Field	Description
MPS Name	Name of the MPOA server.
MPS id	ID of the MPOA server.
Interface	Interface to which the MPS is attached.
State	State of the MPOA server: up or down.
network-id	Network ID used for partitioning.
Keepalive	Keepalive time value.

Table 35 show mpoa server Field Descriptions (continued)

Field	Description
Holding time	Holding time value.
Keepalive lifetime	Keepalive lifetime value.
Giveup time	Minimum time to wait before giving up on a pending resolution request.
MPS actual operating address	Actual control address of this MPS.
Lane clients bound to MPS ip_mps	List of LANE clients served by the MPS.
Discovered neighbours	MPOA devices discovered by the clients bound to this MPS.

Related Commands

Command	Description
clear mpoa server name	Clears the ingress and egress cache entries of one or all MPCs.

show network-clocks

To display the current configured and active network clock sources, use the **show network-clocks** command in privileged EXEC mode.

show network-clocks

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

This command applies to Voice over Frame Relay, Voice over ATM, and Voice over HDLC on the Cisco MC3810.

The Cisco MC3810 has a background task that verifies whether a valid clocking configuration exists every 120 seconds. If this task detects an error, you will be reminded every 120 seconds until the error is corrected. A clocking configuration error may be generated for various reasons. Using the **show network-clocks** command, you can display the clocking configuration status.

Examples

The following is sample output from the **show network-clocks** EXEC command:

```
Router# show network-clocks

Priority 1 clock source: ATM3/0/0
Priority 2 clock source: System clock
Priority 3 clock source: System clock
Priority 4 clock source: System clock

Current clock source:ATM3/0/0, priority:1
```

The following is sample output from the **show network-clocks** command on the Cisco MC3810:

```
Router# show network-clocks

Priority 1 clock source(inactive config): T1 0
Priority 1 clock source(active config) : T1 0
Clock switch delay: 10
Clock restore delay: 10
T1 0 is clocking system bus for 9319 seconds.
Run Priority Queue: controller0
```

In this display, inactive configuration is the new configuration that has been established. Active configuration is the run-time configuration. Should an error be made in the new configuration, the inactive and active configurations will be different. In the previous example, the clock priority configuration is valid, and the system is being clocked as indicated.

The following is another sample output from the **show network-clocks** command:

```
Router# show network-clocks

Priority 1 clock source(inactive config) : T1 0
Priority 2 clock source(inactive config) : T1 1
Priority 1 clock source(active config) : T1 0
Clock switch delay: 10
Clock restore delay: 10
T1 0 is clocking system bus for 9319 seconds.
Run Priority Queue: controller0
```

In this display, the new clocking configuration has an error for controller T1 1. This is indicated by checking differences between the last valid configuration (active) and the new proposed configuration (inactive). The error may result from hardware (the system controller board or MFT) unable to support this mode, or controller T1 1 is currently configured as "clock source internal."

Since the active and inactive configurations are different, the system will periodically display the warning message about the wrong configuration.

Related Commands

Command	Description
network-clock-select (ATM)	Establishes the sources and priorities of the requisite clocking signals for an ATM-CES port adapter.

show sscop

To show Service-Specific Connection-Oriented Protocol (SSCOP) details for all ATM interfaces, use the **show sscop** command in privileged EXEC mode.

show sscop

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.

Examples

The following is sample output from the **show sscop** command:

```
Router# show sscop

SSCOP details for interface ATM4/0
   Current State = Data Transfer Ready
   Send Sequence Number: Current = 2,  Maximum = 9
   Send Sequence Number Acked = 3
   Rcv Sequence Number: Lower Edge = 2, Upper Edge = 2, Max = 9
   Poll Sequence Number = 1876, Poll Ack Sequence Number = 2
   Vt(Pd) = 0
   Connection Control:  timer = 1000
   Timer currently Inactive
   Keep Alive Timer = 30000
   Current Retry Count = 0, Maximum Retry Count = 10
      Statistics -
      Pdu's Sent = 0, Pdu's Received = 0, Pdu's Ignored = 0
      Begin = 0/1, Begin Ack = 1/0, Begin Reject = 0/0
      End = 0/0, End Ack = 0/0
      Resync = 0/0, Resync Ack = 0/0
      Sequenced Data = 2/0, Sequenced Poll Data = 0/0
      Poll = 1591/1876, Stat = 0/1591, Unsolicited Stat = 0/0
      Unassured Data = 0/0, Mgmt Data = 0/0, Unknown Pdu's = 0
```

Table 36 describes the fields shown in the display. Interpreting this output requires a good understanding of the SSCOP; it is usually displayed by our technicians to help diagnose network problems.

Table 36 show sscop Field Descriptions

Field	Description
SSCOP details for interface	Interface slot and port.
Current State	SSCOP state for the interface.
Send Sequence Number	Current and maximum send sequence number.
Send Sequence Number Acked	Sequence number of packets already acknowledged.

Table 36 show sscop Field Descriptions (continued)

Field	Description
Rcv Sequence Number	Sequence number of packets received.
Poll Sequence Number	Current poll sequence number.
Poll Ack Sequence Number	Poll sequence number already acknowledged.
Vt(Pd)	Number of sequenced data (SD) frames sent, which triggers a sending of a Poll frame.
Connection Control	Timer used for establishing and terminating SSCOP.
Keep Alive Timer	Timer used to send keepalives on an idle link.
Current Retry Count	Current count of the retry counter.
Maximum Retry Count	Maximum value the retry counter can take.
Pdu's Sent	Total number of SSCOP frames sent.
Pdu's Received	Total number of SSCOP frames received.
Pdu's Ignored	Number of invalid SSCOP frames ignored.
Begin	Number of Begin frames sent/received.
Begin Ack	Number of Begin Ack frames sent/received.
Begin Reject	Number of Begin Reject frames sent/received.
End	Number of End frames sent/received.
End Ack	Number of End Ack frames sent/received.
Resync	Number of Resync frames sent/received.
Resync Ack	Number of Resync Ack frames sent/received.
Sequenced Data	Number of Sequenced Data frames sent/received.
Sequenced Poll Data	Number of Sequenced Poll Data frames sent/received.
Poll	Number of Poll frames sent/received.
Stat	Number of Stat frames sent/received.
Unsolicited Stat	Number of Unsolicited Stat frames sent/received.
Unassured Data	Number of Unassured Data frames sent/received.
Mgmt Data	Number of Mgmt Data frames sent/received.
Unknown Pdu's	Number of Unknown Pdu's frames sent/received.

sscop cc-timer

To change the connection control timer, use the **sscop cc-timer** interface configuration command. To restore the default value, use the **no** form of this command.

sscop cc-timer *seconds*

no sscop cc-timer

Syntax Description

seconds	Number of seconds between Begin messages.

Defaults

1 second

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

The connection control timer determines the time between transmission of BGN (establishment), END (release), or RS (resynchronization) protocol data units (PDUs) as long as an acknowledgment has not been received.

Examples

The following example sets the connection control timer 15 seconds:

```
sscop cc-timer 15
```

Related Commands

Command	Description
sscop max-cc	Changes the SSCOP retry count of connection control.

sscop keepalive-timer

To change the keepalive timer, use the **sscop keepalive-timer** interface configuration command. To restore the default value, use the **no** form of this command.

sscop keepalive-timer *seconds*

no sscop keepalive-timer *seconds*

Syntax Description

seconds	Number of seconds the router waits between transmission of POLL PDUs when no sequential data (SD) or SDP PDUs are queued for transmission or are outstanding pending acknowledgments.

Defaults

5 seconds

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Examples

The following example sets the keepalive timer to 15 seconds:

```
sscop keepalive-timer 15
```

sscop max-cc

To change the retry count of connection control, use the **sscop max-cc** interface configuration command. To restore the default value, use the **no** form of this command.

sscop max-cc *retries*

no sscop max-cc

Syntax Description

retries	Number of times that SSCOP will retry to transmit BGN (establishment), END (release), or RS (resynchronization) PDUs as long as an acknowledgment has not been received. Valid range is from 1 to 6000.

Defaults

10 retries

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Examples

The following example sets the retry count of the connection control to 20:

```
sscop max-cc 20
```

Related Commands

Command	Description
sscop cc-timer	Changes the SSCOP connection control timer.

sscop poll-timer

To change the poll timer, use the **sscop poll-timer** interface configuration command. To restore the default value, use the **no** form of this command.

sscop poll-timer *seconds*

no sscop poll-timer

Syntax Description

seconds	Number of seconds that the router waits between transmission of POLL PDUs.

Defaults

100 seconds

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

The poll timer controls the maximum time between transmission of POLL PDUs when SD or SDP PDUs are queued for transmission or are outstanding pending acknowledgments.

Examples

The following example sets the poll timer to 15 seconds:

```
sscop poll-timer 15
```

sscop receive-window

To change the receiver window, use the **sscop receive-window** interface configuration command. To restore the default value, use the **no** form of this command.

sscop receive-window *packets*

no sscop receive-window

Syntax Description

packets	Number of packets the interface can receive before it must send an acknowledgment to the ATM switch. Valid range is from 1 to 6000.

Defaults

7 packets

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Examples

The following example sets the receiver's window to 10 packets:

```
sscop rcv-window 10
```

sscop send-window

To change the transmitter window, use the **sscop send-window** interface configuration command. To restore the default value, use the **no** form of this command.

sscop send-window *packets*

no sscop send-window

Syntax Description

packets	Number of packets the interface can send before it must receive an acknowledgment from the ATM switch. Valid range is from 1 to 6000.

Defaults

7 packets

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Examples

The following example sets the transmitter's window to 10 packets:

```
sscop send-window 10
```

SVC

To create an ATM switched virtual circuit (SVC) and specify the destination network service access point (NSAP) address on a main interface or subinterface, use the **svc** interface configuration command. To disable the SVC, use the **no** form of this command.

svc [*name*] [**nsap** *address*] [**ces**]

no svc [*name*] [**nsap** *address*] [**ces**]

Syntax Description

name	(Optional) The name of the SVC and map. The name can be up to 16 characters long. A name is required when creating passive a CES SVC.
nsap *address*	(Optional) The destination ATM NSAP address. Must be exactly 40 hexadecimal digits long and in the correct format. See the "Usage Guidelines" section. An NSAP address is required when creating an active CES SVC.
ces	(Optional) Circuit Emulation Service encapsulation. This keyword is available on the OC-3/STM-1 ATM Circuit Emulation Service network module only.

Defaults

No NSAP address is defined.

Command Modes

Interface configuration

Command History

Release	Modification
11.3	This command was introduced.
12.1(2)T	The **ces** keyword was added to configure CES encapsulation when using the OC-3/STM-1 ATM Circuit Emulation Service network module on Cisco 2600 and Cisco 3600 series platform.
12.1(3)T	This command was modified to allow an SVC to be created without having a specific NSAP address associated with it.

Usage Guidelines

After configuring the parameters for an ATM SVC, you must exit the interface-ATM-VC or interface-CES-VC configuration mode in order to enable the SVC settings.

Once you specify a *name* for an SVC, you can reenter the interface-ATM-VC or interface-CES-VC configuration mode by simply entering **svc** *name*.

You can remove an NSAP address and any associated parameters by entering **no svc** *name* or **no svc** *nsap address*.

Creating an SVC without a specific NSAP address will allow a router to accept calls from any ATM address, and allow multiple VCs to be set up using the same configuration.

Use the **ces** keyword to configure an active or passive CES SVC. An active CES SVC can originate and terminate SVC calls. A passive CES SVC can only terminate calls.

Note Cisco IOS does not support creation of SVCs on a point-to-point subinterface.

Examples

SVC Example

The following example creates an SVC called “chicago” on ATM interface 2/0/0:

```
interface atm 2/0/0
  svc chicago
```

SVC with NSAP Address Example

The following example creates an SVC with the name “lion” and specifies the 40-digit hexadecimal destination ATM NSAP address:

```
svc lion nsap 47.0091.81.000000.0040.0B0A.2501.ABC1.3333.3333.05
```

Active CES SVC Example

The following example creates an active CES SVC named “ces1”:

```
interface atm 1/0
  svc ces1 nsap 47.00.00.000000.0040.0B0A.2501.ABC1.01.01.00 ces
```

Passive CES SVC Example

The following example creates a passive CES SVC named “ces2”:

```
interface atm 1/0
  svc ces2 ces
```

ubr

To configure unspecified bit rate (UBR) quality of service (QoS) and specify the output peak cell rate (PCR) for an ATM permanent virtual circuit (PVC), PVC range, switched virtual circuit (SVC), virtual circuit (VC) class, or VC bundle member, use the **ubr** command in the appropriate command mode. To remove the UBR parameter, use the **no** form of this command.

ubr *output-pcr* [*input-pcr*]

no ubr *output-pcr* [*input-pcr*]

Syntax Description

output-pcr	The output PCR in kbps.
input-pcr	(Optional for SVCs only) The input peak cell rate (PCR) in kilobits per second. If this value is omitted, the *input-pcr* will equal the *output-pcr.*

Defaults

UBR QoS at the maximum line rate of the physical interface.

Command Modes

Interface-ATM-VC configuration (for an ATM PVC or SVC)

VC-class configuration (for a VC class)

Bundle-vc configuration (for ATM VC bundle members)

PVC range configuration (for an ATM PVC range)

PVC-in-range configuration (for an individual PVC within a PVC range)

Command History

Release	Modification
11.3 T	This command was introduced.
12.0(3)T	This command was enhanced to support selection of UBR QoS and configuration of output PCR for ATM VC bundles and ATM VC bundle members.
12.1(5)T	This command was made available in PVC range and PVC-in-range configuration modes.

Usage Guidelines

To configure ATM SVCs with an output PCR and an input PCR that differ from each other, you must expressly configure an output value and an input value using the *output-pcr* and *input-pcr* arguments, respectively.

Configure QoS parameters using the **ubr**, **ubr+**, or **vbr-nrt** command. The last command you enter will apply to the PVC or SVC you are configuring.

If the **ubr** command is not explicitly configured on an ATM PVC, SVC, or VC bundle member, the VC inherits the following default configuration (listed in order of next highest precedence):

- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC or SVC itself.
- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC's or SVC's ATM subinterface.

- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC's or SVC's ATM main interface.
- Global default: UBR QoS at the maximum line rate of the PVC or SVC.

To use this command in VC-class configuration mode, enter the **vc-class atm** global configuration command. This command has no effect if the VC class that contains the command is attached to a standalone VC, that is, if the VC is not a bundle member.

To use this command in bundle-vc configuration mode, first enter the **bundle** command to specify the bundle, then enter bundle configuration mode. Then enter the **pvc-bundle** configuration command to add the VC to the bundle as a member of it and enter bundle-vc configuration mode.

VCs in a VC bundle are subject to the following configuration inheritance rules (listed in order of next highest precedence):

- VC configuration in bundle-vc mode
- Bundle configuration in bundle mode (with effect of assigned VC-class configuration)
- Subinterface configuration in subinterface mode

Examples

The following example specifies the *output-pcr* argument for an ATM PVC to be 100,000 kbps:

```
pvc 1/32
 ubr 100000
```

The following example specifies the *output-pcr* and *input-pcr* arguments for an ATM SVC to be 10,000 kbps and 9,000 kbps, respectively:

```
svc lion nsap 47.0091.81.000000.0040.0B0A.2501.ABC1.3333.3333.05
 ubr 10000 9000
```

Related Commands

Command	Description
abr	Selects ABR QoS and configures output peak cell rate and output minimum guaranteed cell rate for an ATM PVC or virtual circuit class.
broadcast	Configures broadcast packet duplication and transmission for an ATM VC class, PVC, SVC, or VC bundle.
bump	Configures the bumping rules for a virtual circuit class that can be assigned to a virtual circuit bundle.
bundle	Creates a bundle or modifies an existing bundle to enter bundle configuration mode.
class-int	Assigns a VC class to an ATM main interface or subinterface.
class-vc	Assigns a VC class to an ATM PVC, SVC, or VC bundle member.
encapsulation	Sets the encapsulation method used by the interface.
inarp	Configures the Inverse ARP time period for an ATM PVC, VC class, or VC bundle.
oam-bundle	Enables end-to-end F5 OAM loopback cell generation and OAM management for a virtual circuit class that can be applied to a virtual circuit bundle.
oam retry	Configures parameters related to OAM management for an ATM PVC, SVC, VC class, or VC bundle.

Command	Description
precedence	Configures precedence levels for a virtual circuit class that can be assigned to a virtual circuit bundle and thus applied to all virtual circuit members of that bundle.
protect	Configures a virtual circuit class with protected group or protected virtual circuit status for application to a virtual circuit bundle member.
protocol (ATM)	Configures a static map for an ATM PVC, SVC, VC class, or VC bundle. Enables Inverse ARP or Inverse ARP broadcasts on an ATM PVC by either configuring Inverse ARP directly on the PVC, on the VC bundle, or in a VC class (applies to IP and IPX protocols only).
pvc-bundle	Adds a PVC to a bundle as a member of the bundle and enters bundle-vc configuration mode in order to configure that PVC bundle member.
ubr+	Configures UBR QoS and specifies the output peak cell rate and output minimum guaranteed cell rate for an ATM PVC, SVC, VC class, or VC bundle member.
vbr-nrt	Configures the VBR-NRT QoS and specifies output peak cell rate, output sustainable cell rate, and output maximum burst cell size for an ATM PVC, SVC, VC class, or VC bundle member.

ubr+

To configure unspecified bit rate (UBR) quality of service (QoS) and specify the output peak cell rate and output minimum guaranteed cell rate for an ATM permanent virtual circuit (PVC), PVC range, switched virtual circuit (SVC), virtual circuit (VC) class, or VC bundle member, use the **ubr+** command in the appropriate command mode. To remove the UBR+ parameters, use the **no** form of this command.

ubr+ *output-pcr output-mcr* [*input-pcr*] [*input-mcr*]

no ubr+ *output-pcr output-mcr* [*input-pcr*] [*input-mcr*]

Syntax Description

output-pcr	The output peak cell rate (PCR) in kbps.
output-mcr	The output minimum guaranteed cell rate in kbps.
input-pcr	(Optional for SVCs only) The input PCR in kbps. If this value is omitted, the *input-pcr* equals the *output-pcr.*
input-mcr	(Optional for SVCs only) The input minimum guaranteed cell rate in kbps. If this value is omitted, the *input-mcr* equals the *output-mcr.*

Command Default

UBR QoS is at the maximum line rate of the physical interface.

Command Modes

Interface-ATM-VC configuration (for an ATM PVC on non-DSL interfaces only or an ATM SVC on non-DSL interfaces only)
VC-class configuration (for a VC class)
Bundle-VC configuration (for ATM VC bundle members)
PVC range configuration (for an ATM PVC range)
PVC-in-range configuration (for an individual PVC within a PVC range)

Command History

Release	Modification
11.3 T	This command was introduced.
12.0(3)T	This command was enhanced to support selection of UBR+ QoS and configuration of output PCR and output minimum guaranteed cell rate for ATM VC bundles and VC bundle members.
12.1(5)T	This command was made available in PVC range and PVC-in-range configuration modes.
12.4(2)XA	This command was enabled on DSL ATM interfaces.
12.4(6)T	This command was enabled on DSL ATM interfaces.

Usage Guidelines

To configure ATM SVCs with an output PCR and an input PCR that differ from each other, you must expressly configure an output value and an input value using the *output-pcr, output-mcr, input-pcr,* and *input-mcr* arguments.

Configure QoS parameters using the **ubr**, **ubr+**, or **vbr-nrt** command. The last command that you enter will apply to the PVC or SVC that you are configuring.

If the **ubr+** command is not explicitly configured on an ATM PVC or SVC, the VC inherits the following default configuration (in order of precedence):

- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC or SVC itself
- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC ATM subinterface or SVC ATM subinterface
- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC main interface or SVC ATM main interface
- Global default: UBR QoS at the maximum line rate of the PVC or SVC

To use this command in VC-class configuration mode, enter the **vc-class atm** global configuration command before you enter the **ubr+** command. This command has no effect if the VC class that contains the command is attached to a standalone VC (meaning a VC that is not a bundle member).

To use this command in bundle-VC configuration mode, enter the **bundle** command to specify the bundle to which the VC member belongs, then enter bundle configuration mode. Finally, enter the **pvc-bundle** bundle configuration command to add the VC to the bundle as a member.

VCs in a VC bundle use the following configuration inheritance rules (in order of next-highest precedence):

- VC configuration in bundle-VC mode
- Bundle configuration in bundle mode (with effect of assigned VC-class configuration)
- Subinterface configuration in subinterface mode

DSL ATM interfaces do not support switched virtual circuits (SVCs).

Examples

The following example configures UBR+ PVC on a DSL line:

```
interface atm 0/0
 pvc 4/100
  ubr+ 2304 2304
```

The following example specifies the *output-pcr* argument for an ATM PVC to be 100000 kbps and the *output-mcr* to be 3000 kbps:

```
pvc 1/32
 ubr+ 100000 3000
```

The following example specifies the *output-pcr*, *output-mcr*, *input-pcr*, and *input-mcr* arguments for an ATM SVC to be 10000 kbps, 3000 kbps, 9000 kbps, and 1000 kbps, respectively:

```
svc lion nsap 47.0091.81.000000.0040.0B0A.2501.ABC1.3333.3333.05
 ubr+ 10000 3000 9000 1000
```

Related Commands

Command	Description
abr	Selects ABR QoS and configures the output peak cell rate and the output minimum guaranteed cell rate for an ATM PVC or VC class.
broadcast	Configures broadcast packet duplication and transmission for an ATM VC class, PVC, SVC, or VC bundle.
bump	Configures the bumping rules for a VC class that can be assigned to a VC bundle.

Command	Description
bundle	Creates a bundle or enters bundle configuration mode to modify an existing bundle.
class	Assigns a VC class to an ATM main interface, subinterface, PVC, SVC, VC bundle, or VC bundle member.
encapsulation	Sets the encapsulation method used by the interface.
inarp	Configures the InARP time period for an ATM PVC, VC class, or VC bundle.
oam-bundle	Enables end-to-end F5 OAM loopback cell generation and OAM management for a VC class that can be applied to a VC bundle.
oam retry	Configures parameters related to OAM management for an ATM PVC, SVC, VC class, or VC bundle.
precedence	Configures precedence levels for a VC class that can be assigned to a VC bundle and thus applied to all VC members of that bundle.
protect	Configures a VC class with protected group or protected VC status for application to a VC bundle member.
protocol (ATM)	Configures a static map for an ATM PVC, SVC, VC class, or VC bundle.
pvc-bundle	Adds a PVC to a bundle as a member of the bundle and enters bundle-VC configuration mode to configure that PVC bundle member.
ubr	Configures UBR QoS and specifies the output peak cell rate for an ATM PVC, SVC, VC class, or VC bundle member.
vbr-nrt	Configures the VBR-NRT QoS and specifies output peak cell rate, output sustainable cell rate, and output maximum burst cell size for an ATM PVC, SVC, VC class, or VC bundle member.
vbr-rt	Configures variable bit rate real-time for VoATM voice connections.

vbr-nrt

To configure the variable bit rate-nonreal time (VBR-NRT) quality of service (QoS) and specify output peak cell rate (PCR), output sustainable cell rate, and output maximum burst cell size for an ATM permanent virtual circuit (PVC), PVC range, switched virtual circuit (SVC), VC class, or VC bundle member, use the **vbr-nrt** command in the appropriate command mode. To remove the VBR-NRT parameters, use the **no** form of this command.

vbr-nrt *output-pcr output-scr output-mbs* [*input-pcr*] [*input-scr*] [*input-mbs*]

no vbr-nrt *output-pcr output-scr output-mbs* [*input-pcr*] [*input-scr*] [*input-mbs*]

Syntax Description

output-pcr	The output PCR, in kbps.
output-scr	The output SCR, in kbps.
output-mbs	The output maximum burst cell size, expressed in number of cells.
input-pcr	(Optional for SVCs only) The input PCR, in kbps.
input-scr	(Optional for SVCs only) The input SCR, in kbps.
input-mbs	(Optional for SVCs only) The input maximum burst cell size, expressed in number of cells.

Defaults

UBR QoS at the maximum line rate of the physical interface.

Command Modes

Interface-ATM-VC configuration (for an ATM PVC or SVC)

VC-class configuration (for a VC class)

Bundle-vc configuration (for ATM VC bundle members)

PVC range configuration (for an ATM PVC range)

PVC-in-range configuration (for an individual PVC within a PVC range)

Command History

Release	Modification
11.3 T	This command was introduced.
12.0(3)T	This command was enhanced to support configuration of VBR-NRT QoS and specification of output PCR, output SCR, and output maximum burst cell size for ATM bundles and VC bundle members.
12.1(5)T	This command was made available in PVC range and PVC-in-range configuration modes.

Usage Guidelines

Configure QoS parameters using the **ubr**, **ubr+**, or **vbr-nrt** command. The last command you enter will apply to the PVC or SVC you are configuring.

If the **vbr-nrt** command is not explicitly configured on an ATM PVC or SVC, the VC inherits the following default configuration (listed in order of precedence):

- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC or SVC itself.
- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC's or SVC's ATM subinterface.
- Configuration of any QoS command (**ubr**, **ubr+**, or **vbr-nrt**) in a VC class assigned to the PVC's or SVC's ATM main interface.
- Global default: UBR QoS at the maximum line rate of the PVC or SVC.

To use this command in VC-class configuration mode, enter the **vc-class atm** global configuration command before you enter the **vbr-nrt** command. This command has no effect if the VC class that contains the command is attached to a standalone VC, that is, if the VC is not a bundle member.

To use this command in bundle-vc configuration mode, first enter the **pvc-bundle** configuration command to add the VC to the bundle as a member of it, then and enter bundle-vc configuration mode.

VCs in a VC bundle are subject to the following configuration inheritance rules (listed in order of precedence):

- VC configuration in bundle-vc mode
- Bundle configuration in bundle mode (with effect of assigned VC-class configuration)
- Subinterface configuration in subinterface mode

Examples

The following example specifies the *output-pcr* argument for an ATM PVC to be 100,000 kbps, the *output-scr* argument to be 50,000 kbps, and the *output-mbs* to be 64:

```
pvc 1/32
 vbr-nrt 100000 50000 64
```

The following example specifies the VBR-NRT output and input parameters for an ATM SVC:

```
svc lion nsap 47.0091.81.000000.0040.0B0A.2501.ABC1.3333.3333.05
 vbr-nrt 10000 5000 32 20000 10000 64
```

Related Commands

Command	Description
abr	Selects ABR QoS and configures output peak cell rate and output minimum guaranteed cell rate for an ATM PVC or virtual circuit class.
broadcast	Configures broadcast packet duplication and transmission for an ATM VC class, PVC, SVC, or VC bundle.
bump	Configures the bumping rules for a virtual circuit class that can be assigned to a virtual circuit bundle.
bundle	Creates a bundle or modifies an existing bundle to enter bundle configuration mode.
class-int	Assigns a VC class to an ATM main interface or subinterface.
class-vc	Assigns a VC class to an ATM PVC, SVC, or VC bundle member.
encapsulation	Sets the encapsulation method used by the interface.
inarp	Configures the Inverse ARP time period for an ATM PVC, VC class, or VC bundle.

Command	Description
oam-bundle	Enables end-to-end F5 OAM loopback cell generation and OAM management for a virtual circuit class that can be applied to a virtual circuit bundle.
oam retry	Configures parameters related to OAM management for an ATM PVC, SVC, VC class, or VC bundle.
precedence	Configures precedence levels for a virtual circuit class that can be assigned to a virtual circuit bundle and thus applied to all virtual circuit members of that bundle.
protect	Configures a virtual circuit class with protected group or protected virtual circuit status for application to a virtual circuit bundle member.
protocol (ATM)	Configures a static map for an ATM PVC, SVC, VC class, or VC bundle. Enables Inverse ARP or Inverse ARP broadcasts on an ATM PVC by either configuring Inverse ARP directly on the PVC, on the VC bundle, or in a VC class (applies to IP and IPX protocols only).
pvc-bundle	Adds a PVC to a bundle as a member of the bundle and enters bundle-vc configuration mode in order to configure that PVC bundle member.
ubr	Configures UBR QoS and specifies the output peak cell rate for an ATM PVC, SVC, VC class, or VC bundle member.
ubr+	Configures UBR QoS and specifies the output peak cell rate and output minimum guaranteed cell rate for an ATM PVC, SVC, VC class, or VC bundle member.

vc-class atm

To create a virtual circuit (VC) class for an ATM permanent virtual circuit (PVC), switched virtual circuit (SVC), or ATM interface and enter vc-class configuration mode, use the **vc-class atm** global configuration command. To remove a VC class, use the **no** form of this command.

vc-class atm *name*

no vc-class atm *name*

Syntax Description

name	Name of your VC class.

Defaults

No VC class is defined.

Command Modes

Global configuration

Command History

Release	Modification
11.3 T	This command was introduced.

Usage Guidelines

If an SVC command (for example, the **idle-timeout** or **oam-svc** command) is applied on a PVC, the command is ignored. This is also true if a PVC command is applied to an SVC.

Examples

The following example creates a VC class named “pvc-qos”:

```
vc-class atm pvc-qos
```