Configuring ATM Router Module Interfaces

This chapter describes steps required to configure the ATM router module on the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. The ATM router module allows you to integrate Layer 3 switching with ATM switching on the same ATM switch router.

Note This chapter provides advanced configuration instructions for the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM switch routers. For complete descriptions of the commands mentioned in this chapter, refer to the *ATM Switch Router Command Reference* publication. For hardware installation and cabling instructions, refer to the *ATM Port Adapter and Interface Module Installation Guide*.

Note ATM router module and Layer 3 feature support is only available with the Catalyst 8510 MSR system software image. You can download this image to a LightStream 1010 ATM switch router with ASP-C and FC-PFQ installed. The LightStream 1010 image does not include support for the ATM router module or Layer 3 features.

This chapter includes the following sections:

- Overview of the ATM Router Module on page 21-2
- Hardware and Software Restrictions on page 21-4
- Configuring ATM Router Module Interfaces on page 21-6
- Configuring LECs on ATM Router Module Interfaces (Catalyst 8540 MSR) on page 21-7
- Configuring RFC 1483 on page 21-13
- Configuring Classical IP over ATM in a PVC Environment on page 21-16
- Configuring Bridging on page 21-17
- Configuring IP Multicast on page 21-20

Overview of the ATM Router Module

The ATM router module interface module allows you to integrate Layer 3 routing and ATM switching within a single chassis. When you install the ATM router module, you no longer need to choose either Layer 3 or ATM technology, as is frequently the case with enterprise campus and MAN applications.

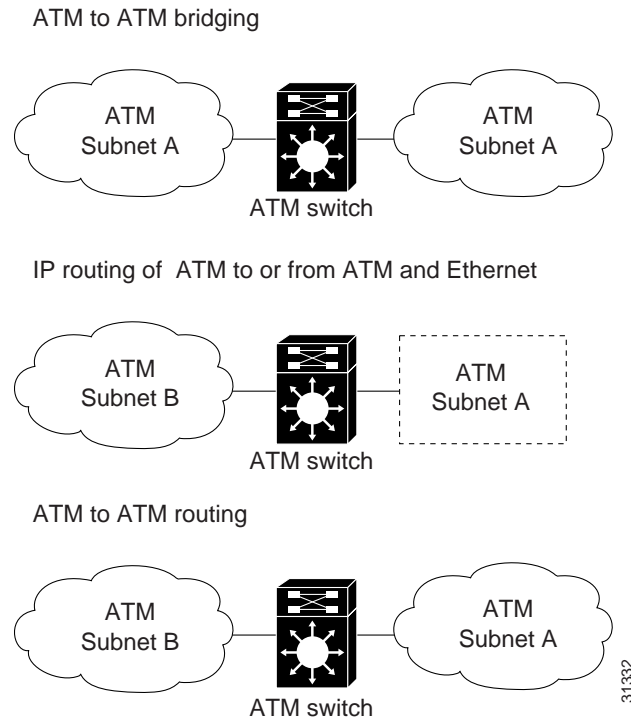The Catalyst 8540 MSR ATM router module offers the following benefits:

- Interoperates with all of the Layer 3 switching interface modules available in the Catalyst 8540 CSR chassis. For more information on the Catalyst 8540 CSR Layer 3 interface modules, refer to the *Catalyst 8540 CSR Route Processor and Interface Module Installation Guide*.

- Provides an integrated high performance link between ATM and Layer 3 cards. The ATM router module provides an aggregate switching capacity of 2 Gbps between ATM and Layer 3 ports (2 x 1 Gbps interfaces per module). Data transfers to the switch core at the rate of 1 Gbps.

- Simplifies management.

- Hot-swappable.

- Occupies only one slot in the chassis.

- Supports LANE clients (LECs).

- Supports multiprotocol encapsulation over ATM (RFC 1483) and classical ATM over IP permanent virtual channels (PVCs) (RFC 1577).

- Supports Bridge Group Virtual Interface (BVI).

- Supports PVC management using OAM.

The Catalyst 8510 MSR and LightStream 1010 ATM router module offers the following benefits:

- Interoperates with all of the Layer 3 switching interface modules available in the Catalyst 8510 CSR chassis. For more information on the Catalyst 8510 CSR Layer 3 interface modules, refer to the *Catalyst 8510 CSR Route Processor and Interface Module Installation Guide*.

- Provides an integrated high performance link between ATM and Layer 3 cards. The ATM router module provides a switching capacity of 1 Gbps between ATM and Layer 3 ports. Data transfers to the switch core at the rate of 1 Gbps.

- Simplifies management.

- Hot-swappable.

- Occupies only one slot in the chassis.

- Supports multiprotocol encapsulation over ATM (RFC 1483) and classical ATM over IP permanent virtual channels (PVCs) (RFC 1577).

- Supports BVI.

- Supports PVC management using OAM.

The ATM router module has no external interfaces. All traffic is sent and received through internal interfaces to the switching fabric. The Catalyst 8540 MSR ATM router module has two internal ports and for the Catalyst 8510 MSR and LightStream 1010 ATM router module has one internal port.
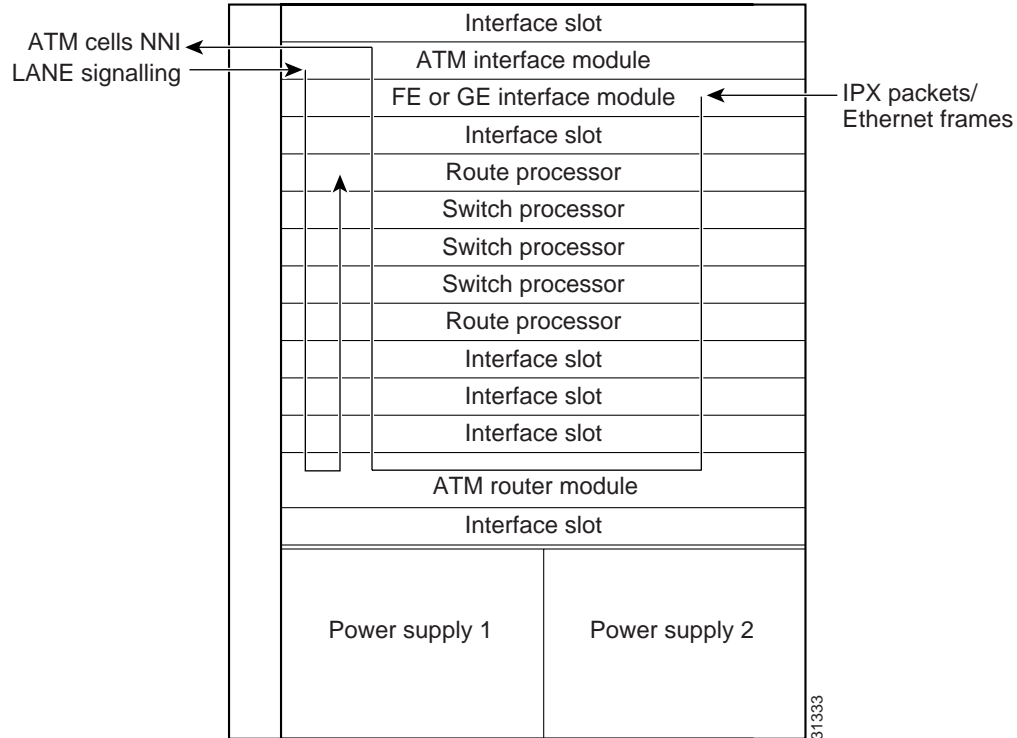
The ATM router module can perform one or more of the functions described in Figure 21-1.

Figure 21-1   ATM Router Module Routing and Bridging Functions

ATM to ATM bridging

ATM switch

IP routing of ATM to or from ATM and Ethernet

ATM switch

ATM to ATM routing

ATM switch

The ATM router module receives Address Resolution Protocol (ARP) messages and route broadcasts from connected ATM peers and sends the appropriate control information to the route processor. On the ATM side, the ATM router module connects to the switching fabric as would any other interface module.

On the Catalyst 8540 MSR, the ATM router module supports LANE clients (LECs), but not the LANE servers (LES, LECS, and BUS). It separates the control and data path so that all LANE control messages are handled by the route processor, and data messages are switched on the ATM router module port, as shown in Figure 21-2. The LEC is configured on the ATM router module interface, but control message traffic is sent to the route processor by the ATM router module. The ATM router module sends all ATM data traffic to the appropriate VCs.

Figure 21-2   ATM Router Module Traffic Flow (Catalyst 8540 MSR)

Interface slot
ATM interface module
FE or GE interface module
Interface slot
Route processor
Switch processor
Switch processor
Switch processor
Route processor
Interface slot
Interface slot
Interface slot
ATM router module
Interface slot

ATM cells NNI
LANE signalling

IPX packets/
Ethernet frames

Power supply 1   Power supply 2

31333

Hardware and Software Restrictions

The following hardware restrictions apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM router modules:

*   You can install the ATM router module in any slot except a route processor slot, and, in the case of the Catalyst 8540 MSR, a switch processor slot.

*   The ATM router module is only supported on LightStream 1010 ATM switches with ASP-C and feature card per-flow queuing (FC-PFQ) installed.

*   You can install up to two ATM router modules per chassis.

*   When you hot swap an ATM router module, wait one minute after removing the module before inserting a new module.

Note   The ATM router module is only supported on ATM switches which have ASP-C with FC-PFQ installed.

The following software restrictions apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM router modules:

- Use tag switching functionality with caution. Do not distribute routes learned through tag switching to Fast Ethernet (FE) or Gigabit Ethernet (GE), or vice versa. Otherwise, you might have unreachable route destinations.

- The ATM router module does not initialize if it replaces an ATM port adapter or interface module when hierarchical VP tunnels are globally enabled. Reboot the switch to initialize the ATM router module.

- ATM Director does not support any PVC commands.

- Only LANE clients or RFC 1483, not both, can be configured on an ATM router module interface.

- RFC 1483 on the ATM router module supports only ATM adaption layer 5 (AAL5) Subnetwork Access Protocol (SNAP) encapsulation.

The Catalyst 8540 MSR, Catalyst 8510 MSR, and LightStream 1010 ATM router modules do not support the following features:

- Point-to-point subinterfaces. Only point-to-multipoint subinterfaces are supported.

- Tag-edged router functionality

- Fast Simple Server Redundancy Protocol (FSSRP)

- Bridging for multiplexing device encapsulation

- Protocol Independent Multicast (PIM) IP multipoint signalling

- PIM nonbroadcast multiaccess (NBMA)

- PIM over ATM multipoint signalling

- Translation from IP quality of service (QoS) to ATM QoS

- Resource Reservation Protocol (RSVP) to ATM SVC

- PVC management using ILMI

- Access lists for ATM to ATM routing

- Half-bridge devices

- RFC 1577 SVCs

- RFC 1483 MUX encapsulation

The following software restrictions apply to the Catalyst 8540 MSR ATM router modules:

- You can have a maximum of 64 LECs per chassis.

- Do not install an ATM router module in a slot pair where hierarchical VP tunnels are configured. Slot pairs 0 and 1, 2 and 3, 9 and 10, and 11 and 12 use the same switching modules for scheduling. For example, do not install an ATM router module in slot 10 when hierarchical VP tunnels are configured on slot 9. For more information on hierarchical VP tunneling restrictions, refer to the "Configuring a Hierarchical VP Tunnel for Multiple Service Categories" section on page 6-37.

- Token Ring LANE is not supported.

The following software restrictions apply to Catalyst 8510 MSR and LightStream 1010 ATM router modules:

- Do not install an ATM router module in a slot pair where hierarchical VP tunnels are configured. Slot pair 0 and 1 and slot pair 3 and 4 use the same switching modules for scheduling. For example, do not install an ATM router module in slot 1 when hierarchical VP tunnels are configured on slot 0. For more information on hierarchical VP tunneling restrictions, refer to the "Configuring a Hierarchical VP Tunnel for Multiple Service Categories" section on page 6-37.

- LANE clients are not supported.

- Only UBR PVCs are supported.

Note   The ATM router module is only supported on ATM switches which have ASP-C with FC-PFQ installed.

Note   ATM router module and Layer 3 feature support is only available with the Catalyst 8510 MSR system software image. You can download this image to a LightStream 1010 ATM switch router with ASP-C and FC-PFQ installed. The LightStream 1010 image does not include support for the ATM router module or Layer 3 features.

Configuring ATM Router Module Interfaces

The you can configure the following features directly on the ATM router module interfaces:

- Maximum virtual channel identifier (VCI) bits

- LANE component LEC (Catalyst 8540 MSR)

- RFC 1483

- Classical IP over ATM (RFC 1577)

- Bridging

- IP multicast

Note   This document describes how to configure ATM software features only. For information on how to configure the Layer 3 modules that interoperate with the ATM router module in the Catalyst 8540 MSR chassis, refer to the *Layer 3 Switching Software Feature and Configuration Guide*, which is available on the Documentation CD-ROM that came with your ATM switch router, online at Cisco.com, or you can order a hard copy separately.

Note   ATM router modules have internal interfaces, but no external ports. Use the **interface atm** *card*/*subcard*/*port* command to specify these interfaces.

Note   Virtual path identifier (VPI) 2 is reserved for ATM router module interfaces, which allows you to configure up to 2048 external VCs on each ATM router module interface. Using VPI 0 would have allowed less than 1024 external VCs on an ATM router module interface because the ATM router module external VCs would have been forced to share the VC space within VPI 0 with the internal PVCs.

Default ATM Router Module Interface Configuration Without Autoconfiguration

If ILMI is disabled or if the connecting end node does not support ILMI, the following defaults are assigned to all ATM router module interfaces:

- ATM interface type = UNI
- UNI version = 3.0
- Maximum VCI bits = 11
- ATM interface side = network
- ATM UNI type = private

Manual ATM Router Module Interface Configuration

To manually change the default configuration values, perform the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# **interface atm** *card/subcard/port* Switch(config-if)#	Specifies an ATM interface and enters interface configuration mode.
Step 2	Switch(config-if)# **atm maxvci-bits** *max-vci-bits*	Modifies the maximum number of active VCI bits.

Example

The following example shows how to change the default number of active VCI bits:

```
Switch(config)# interface atm 0/0/0
Switch(config-if)# atm maxvci-bits 10
```

Configuring LECs on ATM Router Module Interfaces (Catalyst 8540 MSR)

The procedures for configuring LANE clients (LECs) on the ATM router module are the same as the configuration for LECs on the route processor, with one exception. To specify an ATM router module interface, rather than the route processor interface, use the **interface atm** *card/subcard/port* command. On the route processor, you would use the **interface atm 0** command.

Note To route traffic between an emulated LAN and a Fast Ethernet (FE) or Gigabit Ethernet (GE) interface, you must configure the LEC on an ATM router module interface rather than a route processor interface.

Note An ATM router module interface can be configured for either LECs or RFC 1483 PVCs, not both. For both features to operate on the same ATM router module, configure LECs on one interface and RFC 1483 PVCs on the other.

To configure a LEC on an ATM router module interface, use the following commands, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# **interface atm** *card*/*subcard*/*port***.***subinterface#* **multipoint** Switch(config-subif)#	Creates the ATM router module point-to-multipoint subinterface and enters subinterface mode. **Note** The ATM router module only supports point-to-multipoint subinterfaces.
Step 2	Switch(config-subif)# **ip address** *ip-address mask*	Provides a protocol address for the client on this subinterface.
Step 3	Switch(config-subif)# **lane client ethernet** *elan-name*	Enables a LANE client for an emulated LAN.

Example

The following example shows how to configure two LECs on an ATM router module interface:

```
Switch# configure terminal
Switch(config)# interface atm 1/0/0.4 multipoint
Switch(config-subif)# ip address 40.0.0.1 255.0.0.0
Switch(config-subif)# lane client ethernet VLAN4
Switch(config-subif)# exit
Switch(config)# interface atm 1/0/0.5 multipoint
Switch(config-subif)# ip address 50.0.0.1 255.0.0.0
Switch(config-subif)# lane client ethernet VLAN5
Switch(config-subif)# exit
Switch(config)# router ospf 1
Switch(config-router)# network 40.0.0.0 0.255.255.255 area 0
Switch(config-router)# network 50.0.0.0 0.255.255.255 area 0
```

For more information on configuring LECs on ATM router module interfaces, see the "Configuring a LAN Emulation Client on the ATM Switch Router" section on page 13-13. For a detailed description of LANE and its components, refer to *Cisco IOS Switching Services Configuration Guide: Virtual LANs*.

LEC Configuration Examples

The examples in this section show how to configure LANE clients (LECs) on networks with two routers and one Catalyst 8540 MSR. For detailed information on configuring the LANE server (LES), LANE configuration server (LECS), and broadcast-and-unknown server (BUS), refer to Chapter 13, "Configuring LAN Emulation."

⚠️
Caution   For performance reasons, avoid configuring the LANE server components on ATM switch routers. Instead, configure the LANE server components on a router such as a Cisco 7500 series router or a Catalyst 5500 router with a LANE module installed.

LANE Routing Over ATM

The following example shows how to configure LANE routing over ATM with the ATM router module. Figure 21-3 shows an example of a network for LANE routing over ATM.

Figure 21-3   Example Network for LANE Routing Over ATM
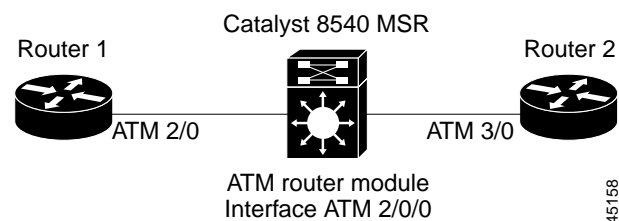
Router 1 ATM Interface

```
Router1# configure terminal
Router1(config)# interface atm 2/0
Router1(config-if)# ip address 1.0.0.1 255.0.0.0
Router1(config-if)# atm pvc 1 0 5 qsaal
Router1(config-if)# atm pvc 2 0 16 ilmi
Router1(config-if)# lane client ethernet happy
Router1(config-if)# end
Router1#
```

ATM Switch Router ATM Router Module Interface

```
Switch# configure terminal
Switch(config)# interface atm 2/0/0
Switch(config-if)# ip address 1.0.0.2 255.0.0.0
Switch(config-if)# lane client ethernet BACKBONE
Switch(config-if)# end
Switch#
```

Router 2 ATM Interface

```
Router2# configure terminal
Router2(config)# interface atm 3/0
Router2(config-if)# ip address 1.0.0.3 255.0.0.0
Router2(config-if)# no ip mroute-cache
Router2(config-if)# atm pvc 1 0 5 qsaal
Router2(config-if)# atm pvc 2 0 16 ilmi
Router2(config-if)# no atm ilmi-keepalive
Router2(config-if)# lane client ethernet BACKBONE
Router2(config-if)# end
Router2#
```

For detailed information on configuring LANE clients (LECs), refer to Chapter 13, "Configuring LAN Emulation."

LANE Routing from ATM to Ethernet

The following example shows how to configure LANE routing from ATM to Ethernet with the ATM router module. Figure 21-4 shows an example of a LANE network for LANE routing from ATM to Ethernet.

Figure 21-4   Example Network for LANE Routing from ATM to Ethernet
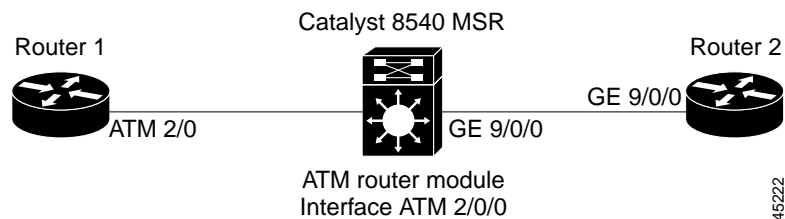
Router 1 ATM Interface

```
Router1# configure terminal
Router1(config)# interface atm 2/0
Router1(config-if)# ip address 1.0.0.1 255.0.0.0
Router1(config-if)# atm pvc 1 0 5 qsaal
Router1(config-if)# atm pvc 2 0 16 ilmi
Router1(config-if)# lane client ethernet happy
Router1(config-if)# end
Router1#
```

ATM Switch Router ATM Router Module Interface

```
Switch# configure terminal
Switch(config)# interface atm 2/0/0
Switch(config-if)# ip address 1.0.0.2 255.0.0.0
Switch(config-if)# lane client ethernet BACKBONE
Switch(config-if)# end
Switch#
```

ATM Switch Router Ethernet Interface

```
Switch# configure terminal
Switch(config)# interface gigabitethernet 9/0/0
Switch(config-if)# ip address 129.1.0.1 255.255.255.0
Switch(config-if)# no ip directed-broadcast
Switch(config-if)# end
Switch#
```
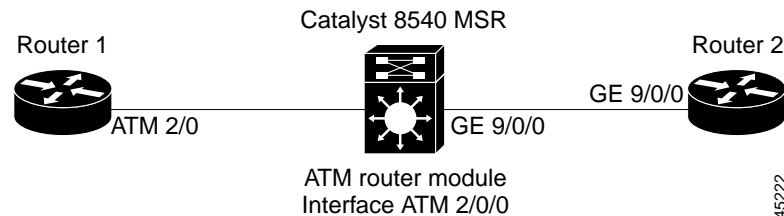
Router 2 Ethernet Interface

```
Router2# configure terminal
Router2(config)# interface gigabitethernet 9/0/0
Router2(config-if)# ip address 129.1.0.2 255.255.255.0
Router2(config-if)# no ip directed-broadcast
Router2(config-if)# end
Router2#
```

Configure the desired network routing protocol, such as RIP, OSPF, or EIGRP, on Ethernet interfaces. For more information on configuring networking protocols and routing, refer to the *Layer 3 Switching Software Feature and Configuration Guide*.

LANE Bridging Between ATM and Ethernet

The following example show how to configure LANE bridging between ATM and Ethernet with the ATM router module. Figure 21-5 shows an example of a network for LANE bridging between ATM and Ethernet.

Figure 21-5   Example Network for LANE Bridging Between ATM and Ethernet

Router 1 ATM Interface

```
Router1# configure terminal
Router1(config)# interface atm 2/0
Router1(config-if)# atm pvc 1 0 5 qsaal
Router1(config-if)# atm pvc 2 0 16 ilmi
Router1(config-if)# lane client ethernet happy
Router1(config-if)# bridge-group 1
Router1(config-if)# end
Router1#
```

Router 1 Bridge Interface

```
Router1# configure terminal
Router1(config)# interface BVI1
Router1(config-if)# ip address 130.2.3.1 255.255.255.0
Router1(config-if)# exit
Router1(config)# bridge 1 protocol ieee
Router1(config)# bridge 1 route ip
Router1(config)# bridge irb
Router1(config)# end
Router1#
```

ATM Switch Router ATM Router Module Interface

```
Switch# configure terminal
Switch(config)# interface atm 2/0/0
Switch(config-if)# lane client ethernet BACKBONE
Switch(config-if)# bridge-group 1
Switch(config-if)# exit
Switch(config)# bridge 1 protocol ieee
Switch(config)# end
Switch#
```

ATM Switch Router Ethernet Interface

```
Switch# configure terminal
Switch(config)# interface gigabitethernet9/0/0
Switch(config-if)# bridge-group 1
Switch(config-if)# end
Switch#
```

Router 2 Ethernet Interface

```
Router2# configure terminal
Router2(config)# interface ethernet 9/0/0
Router2(config-if)# bridge-group 1
Router2(config-if)# end
Router2#
```

Router 2 Bridge Interface

```
Router2# configure terminal
Router2(config)# interface BVI1
Router2(config-if)# ip address 130.2.3.4 255.255.255.0
Router2(config-if)# exit
Router2(config)# bridge 1 protocol ieee
Router2(config)# bridge 1 route ip
Router2(config)# bridge irb
Router2(config)# end
Router2#
```

For more information on configuring bridging, refer to the *Layer 3 Switching Software Feature and Configuration Guide*.

Confirming the LEC Configuration

To confirm the LEC configuration on the ATM switch router, use the following EXEC commands:

Command	Purpose
show lane [**interface atm** *card*/*subcard*/*port*[.*subinterface#*] | **name** *elan-name*] [**brief**]	Displays the global and per-virtual channel connection LANE information for all the LANE components and emulated LANs configured on an interface or any of its subinterfaces.
show lane client [**interface atm** *card*/*subcard*/*port*[.*subinterface#*] | **name** *elan-name*] [**brief**]	Displays the global and per-VCC LANE information for all LANE clients configured on any subinterface or emulated LAN.
show lane config [**interface atm** *card*/*subcard*/*port*[.*subinterface#*]]	Displays the global and per-VCC LANE information for the configuration server configured on any interface.

Configuring RFC 1483

This section describes how to configure multiprotocol encapsulation over ATM, as defined in RFC 1483, on the ATM router module.

The primary use of RFC 1483 is to carry multiple Layer 3 and bridged frames over ATM. RFC 1483 traffic is routed through an ATM router module interface using static map lists. Static map lists provide an alternative to using the ATM Address Resolution Protocol (ARP) and ATM Inverse ARP (InARP) mechanisms. For more information on static map lists, refer to the "Mapping a Protocol Address to a PVC Using Static Map Lists" section on page 12-7.

For a detailed description of RFC 1483, refer to the *Guide to ATM Technology.*

Note   Traffic shaping and policing are not supported on the ATM router module interfaces. Use VP tunnels as an alternative for traffic shaping on ATM connections. For more information on VP tunnels, refer to the "Configuring VP Tunnels" section on page 6-33.

To configure multiprotocol encapsulation over ATM on the ATM router module interface, use the following commands, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# **interface atm** *card*/*subcard*/*port*.*subinterface#* **multipoint** Switch(config-subif)#	Creates the ATM router module point-to-multipoint subinterface and enters subinterface mode. ✎ **Note** The ATM router module only supports point-to-multipoint subinterfaces.
Step 2	Switch(config-subif)# **ip address** *ip-address mask*	Enters the IP address and subnet mask associated with this interface.
Step 3	Switch(config-subif)# **map-group** *name*	Enters the map group name associated with this PVC.
Step 4	Switch(config-subif)# **atm pvc 2** *vci-a* [**upc** *upc*] [**pd** *pd*] [**rx-cttr** *index*] [**tx-cttr** *index*] **interface atm** *card*/*subcard*/*port*[.*vpt#*] *vpi-b vci-b* [**upc** *upc*] **encap aal5snap**	Configures the PVC. ✎ **Note** The VPI number on the ATM router module interface must be 2.
Step 5	Switch(config-subif)# **exit** Switch(config)#	Returns to global configuration mode.
Step 6	Switch(config)# **map-list** *name* Switch(config-map-list)#	Creates a map list by naming it, and enters map-list configuration mode.
Step 7	Switch(config-map-list)# **ip** *ip-address* {**atm-nsap** *address* | **atm-vc** *vci*} [**broadcast**]	Associates a protocol and address with a specific virtual circuit.

Example

The following example shows how to configure RFC 1483 on an ATM router module interface, beginning in global configuration mode:

```
Switch(config)# interface atm 1/0/0.1011 multipoint
Switch(config-subif)# ip address 10.1.1.1 255.255.255.0
Switch(config-subif)# map-group net1011
Switch(config-subif)# atm pvc 2 1011 interface atm 3/0/0 0 1011 encap aal5snap
Switch(config-subif)# exit
Switch(config)# map-list net1011
Switch(config-map-list)# ip 10.1.1.2 atm-vc 1011
Switch(config-map-list)# end
Switch#
```

RFC 1483 Configuration Example

The following example shows how to configure for RFC 1483 with two routers and one ATM switch router.

The ATM switch router has an ATM router module in slot 0, a Fast Ethernet interface module in slot 1, and an ATM interface module in slot 3. One router has an ATM interface processor in slot 3. The other router has a Fast Ethernet interface module in slot 2.

Figure 21-6 shows an example of an RFC 1483 network.

Figure 21-6   Example Network for RFC 1483
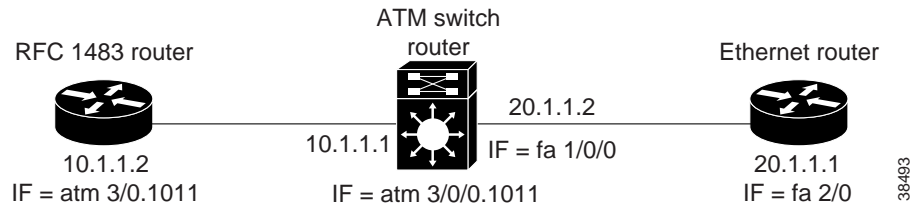
Router with ATM Interface

```
RouterA# configure terminal
RouterA(config)# interface atm 3/0.1011 multipoint
RouterA(config-subif)# ip address 10.1.1.2 255.255.255.0
RouterA(config-subif)# atm pvc 1011 0 1011 aal5snap
RouterA(config-subif)# map group net1011
RouterA(config-subif)# ipx network 1011
RouterA(config-subif)# exit
RouterA(config)# map-list net1011
RouterA(config-map-list)# ip 10.1.1.1 atm-vc 1011
RouterA(config-map-list)# ipx 1011.1111.1111.1111 atm-vc 1011
RouterA(config-map-list)# exit
RouterA(config)#
```

ATM Switch Router

```
Switch# configure terminal
Switch(config)# interface atm 0/0/0.1011 multipoint
Switch(config-subif)# ip address 10.1.1.1 255.255.255.0
Switch(config-subif)# ipx network 1011
Switch(config-subif)# map-group net1011
Switch(config-subif)# atm pvc 2 1011 interface atm 3/0/0 0 1011
Switch(config-subif)# map-list net1011
Switch(config-map-list)# ip 10.1.1.2 atm-vc 1011
Switch(config-map-list)# ipx 1011.2222.2222.2222 atm-vc 1011
Switch(config-map-list)# exit
Switch(config)# interface fastethernet 1/0/0
Switch(config-if)# ip address 20.1.1.2 255.255.255.0
Switch(config-if)# ipx network 2011
Switch(config-if)# end
Switch#
```

Note   The VCI in the **atm pvc** command must match the **atm-vc** VCI in the map list.

Ethernet Router

```
RouterB# configure terminal
RouterB(config)# ipx routing
RouterB(config)# interface fastethernet 2/0
RouterB(config-if)# ip address 20.1.1.1 255.255.255.0
RouterB(config-if)# ipx network 2011
RouterB(config-if)# end
RouterB#
```

Configuring Classical IP over ATM in a PVC Environment

This section describes how you configure classical IP over ATM, as described by RFC 1577, in a PVC environment on the ATM router module. The ATM Inverse ARP (InARP) mechanism is applicable to networks that use permanent virtual channels (PVCs), where connections are established but the network addresses of the remote ends are not known. For more information on configuring ATM ARP and ATM InARP, refer to the "Configuring Classical IP over ATM" section on page 12-1.

For a description of classical IP over ATM and RFC 1577, refer to the *Guide to ATM Technology.*

In a PVC environment, configure the ATM InARP mechanism on the ATM router module by performing the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# **interface atm** *card/subcard/port* Switch(config-if)#	Specifies the interface on the ATM router module to configure.
Step 2	Switch(config-if)# **ip address** *ip-address mask*	Specifies the IP address of the interface.
Step 3	Switch(config-if)# **atm pvc 2** *vci* **interface atm** *card/subcard/port vpi vci* **encap aal5snap** [**inarp** *minutes*]	Creates a PVC and enables ATM InARP. **Note** The VPI number on the ATM router module interface must be 2.

Repeat these tasks for each PVC you want to create.

The **inarp** *minutes* interval specifies how often inverse ARP datagrams are sent on this virtual circuit. The default value is 15 minutes.

Example

The following example shows how to configure an IP-over-ATM interface on interface ATM 3/0/0, using a PVC with AAL5SNAP encapsulation, InARP set to ten minutes, VPI = 2, and VCI = 100:

```
Switch(config)# interface atm 3/0/0
Switch(config-if)# ip address 11.11.11.11 255.255.255.0
Switch(config-if)# atm pvc 2 100 interface atm 0/0/0 50 100 encap aal5snap inarp 10
```

Configuring Bridging

All PVCs configured on ATM router module interfaces are used for bridging.

To configure bridging on an ATM router module interface, use the following commands, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# **interface atm** *card/subcard/port* Switch(config-if)#	Specifies the interface on the ATM router module to configure.
Step 2	Switch(config-if)# **atm pvc 2** *vci* **interface atm** *card/subcard/port vpi*	Configures a PVC. ✎ **Note** The VPI number on the ATM router module interface must be 2.
Step 3	Switch(config-if)# **bridge-group** *number*	Assigns the interface to a bridge group.
Step 4	Switch(config-if)# **end** Switch(config)#	Returns to global configuration mode.
Step 5	Switch(config)# **interface fastethernet** *card/subcard/port* Switch(config-if)#	Specifies the Fast Ethernet interface to configure.
Step 6	Switch(config-if)# **no cdp enable**	Disables Cisco Discovery Protocol on the interface.
Step 7	Switch(config-if)# **bridge-group** *number*	Assigns the interface to a bridge group.
Step 8	Switch(config-if)# **end** Switch(config)#	Returns to global configuration mode.
Step 9	Switch(config)# **bridge 5 protocol ieee**	Specifies IEEE 802.1D Spanning-Tree Protocol for the bridge group.

Example

The following example shows how to configure bridging on a Catalyst 8540 MSR with a Fast Ethernet interface module in slot 0, an ATM interface module in slot 1, and an ATM router module in slot 3.

Figure 21-7 shows an example bridging network.

Figure 21-7   Example Network for Bridging
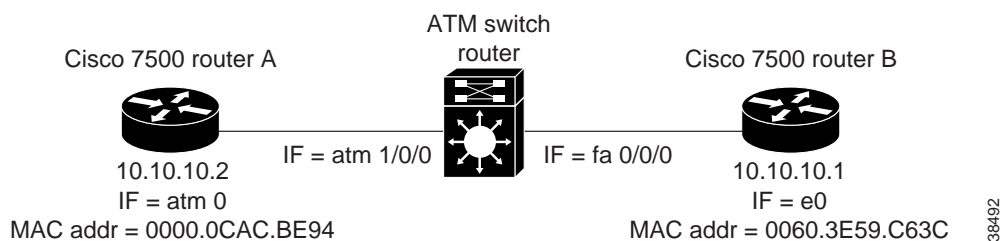
```
Switch(config)# interface atm 3/0/0
Switch(config-if)# atm pvc 2 200 interface atm 1/0/0 0 200
Switch(config-if)# bridge-group 5
Switch(config-if)# end
Switch(config)# interface fastethernet 0/0/0
Switch(config-if)# no cdp enable
Switch(config-if)# bridge-group 5
Switch(config-if)# end
Switch(config)# bridge 5 protocol ieee
```

Configuring Packet Flooding on a PVC

Typically, a specific static map list configuration is not required for bridging to occur. In case of packet flooding, the bridging mechanism individually sends the packet to be flooded on all PVCs configured on the interface. To restrict the broadcast of the packets to only a subset of the configured PVCs you must define a separate static map list. Use the **broadcast** keyword in the **static-map** command to restrict packet broadcasting.

	Command	Purpose
Step 1	Switch(config)# **interface atm** *card*/*subcard*/*port* Switch(config-if)#	Specifies the interface to configure on the ATM router module.
Step 2	Switch(config-if)# **no ip address**	Disables IP processing.
Step 3	Switch(config-if)# **no ip directed-broadcast**	Disables the translation of directed broadcasts to physical broadcasts.
Step 4	Switch(config-if)# **map-group** *number*	Enters the map group name associated with this PVC.
Step 5	Switch(config-if)# **atm pvc 2** *vci-A* **interface atm** *card*/*subcard*/*port vpi-B*	Configures a PVC. ✎ Note The VPI number on the ATM router module interface must be 2.
Step 6	Switch(config-if)# **bridge-group** *number*	Assigns the interface to a bridge group.
Step 7	Switch(config-if)# **end** Switch(config)#	Returns to global configuration mode.
Step 8	Switch(config)# **map-list** *name* Switch(config-map-list)#	Creates a map list by naming it, and enters map-list configuration mode.
Step 9	Switch(config-map-list)# **bridge atm-vc** *number* **broadcast**	Enables packet flooding on a PVC.

Example

In the following example only PVC 2, 200 is used for packet flooding:

```
Switch(config)# interface atm 3/0/0
Switch(config-if)# no ip address
Switch(config-if)# no ip directed-broadcast
Switch(config-if)# map-group bg_1
Switch(config-if)# atm pvc 2 200 interface atm 1/0/1 0 200
Switch(config-if)# atm pvc 2 201 interface atm 1/0/1 0 300
Switch(config-if)# bridge-group 5
Switch(config-if)# end
Switch(config)# map-list bg_1
Switch(config-map-list)# bridge atm-vc 200 broadcast
```

Note   For more information about bridging, refer to the *Layer 3 Switching Software Feature and Configuration Guide*.

Displaying the Bridging Configuration

To display the bridging configuration on the ATM router module interface, use the following privileged EXEC command:

Command	Purpose
show bridge verbose	Displays the entries in the bridge forwarding database.

Example

```
Switch# show bridge verbose

Total of 300 station blocks, 297 free
Codes: P - permanent, S - self
BG Hash      Address      Action  Interface       VC    Age   RX count   TX count
 5 28/0   0000.0ce4.341c forward  Fa0/0/0          -
 5 2A/0   0000.0cac.be94 forward  ATM3/0/0        200
 5 FA/0   0060.3e59.c63c forward  Fa0/0/0          -
```

Configuring IP Multicast

To configure IP multicast over an RFC 1483 permanent virtual channel (PVC) on an ATM router module, use the following commands, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# **ip multicast-routing**	Enables IP multicast routing.
Step 2	Switch(config)# **interface atm** *card/subcard/port.subinterface#* **multipoint** Switch(config-subif)#	Creates the ATM router module point-to-multipoint subinterface and enters subinterface mode. ✎ **Note** The ATM router module only supports point-to-multipoint subinterfaces.
Step 3	Switch(config-subif)# **ip address** *ip-address mask*	Specifies the IP address of the interface.
Step 4	Switch(config-subif)# **map-group** *name*	Enters the map group name associated with this PVC.
Step 5	Switch(config-subif)# **atm pvc 2** *vci-a* [**upc** *upc*] [**pd** *pd*] **interface atm** *card/subcard/port*[*.vpt#*] *vpi-b vci-b* [**upc** *upc*] **encap aal5snap**	Configures the PVC. ✎ **Note** The VPI number on the ATM router module interface must be 2.
Step 6	Switch(config-subif)# **ip pim dense-mode**	Enables Protocol Independent Multicast dense mode on the subinterface.
Step 7	Switch(config-subif)# **exit** Switch(config)#	Returns to global configuration mode.
Step 8	Switch(config)# **map-list** *name* Switch(config-map-list)#	Creates a map list by naming it, and enters map-list configuration mode.
Step 9	Switch(config-map-list)# **ip** *ip-address* {**atm-nsap** *address*	**atm-vc** *vci*} **broadcast**	Associates a protocol and address with a specific virtual circuit
Step 10	Switch(config-map-list)# **end** Switch#	Returns to privileged EXEC mode.

Example

```
Switch(config)# ip multicast-routing
Switch(config)# interface atm 1/0/0.1011 multipoint
Switch(config-subif)# ip address 10.1.1.1 255.255.255.0
Switch(config-subif)# map-group net1011
Switch(config-subif)# atm pvc 2 1011 interface atm 3/0/0 0 1011 encap aal5snap
Switch(config-subif)# ip pim dense-mode
Switch(config-subif)# exit
Switch(config)# map-list net1011
Switch(config-map-list)# ip 10.1.1.2 atm-vc 1011 broadcast
```

Note   For more information about IP multicast, refer to the *Layer 3 Switching Software Feature and Configuration Guide*.