Configuring IP over ATM

This chapter describes how to configure IP over ATM on the ATM switch router. The primary use of IP over ATM is for inband management of the 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 further information about Layer 3 protocols over ATM, refer to the *Guide to ATM Technology*. For complete descriptions of the commands mentioned in this chapter, refer to the *ATM Switch Router Command Reference* publication.

This chapter includes the following sections:

- Configuring Classical IP over ATM on page 12-1
- Mapping a Protocol Address to a PVC Using Static Map Lists on page 12-7

Configuring Classical IP over ATM

This section describes configuring a port on a ATM switch router to allow a classical IP-over-ATM connection to the ATM switch router's route processor and optional ATM router module.

The following sections describe configuring the ATM switch router for classical IP over ATM in either a switched virtual channel (SVC) or permanent virtual channel (PVC) environment.

Configuring Classical IP over ATM in an SVC Environment

This section describes classical IP over ATM in an SVC environment. It requires configuring only the device's own ATM address and that of a single ATM Address Resolution Protocol (ARP) server into each client device.

For a detailed description of the role and operation of the ATM ARP server, refer to the *Guide to ATM Technology*.

The ATM switch router can be configured as an ATM ARP client to work with any ATM ARP server conforming to RFC 1577. Alternatively, one of the ATM switch routers in a logical IP subnet (LIS) can be configured to act as the ATM ARP server itself. In that case, it automatically acts as a client as well. The following sections describe configuring the ATM switch router in an SVC environment as either an ATM ARP client or an ATM ARP server.

Configuring as an ATM ARP Client

In an SVC environment, configure the ATM ARP mechanism on the interface by performing the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# **interface atm 0** Switch(config-if)#	Selects the interface to be configured.
Step 2	Switch(config-if)# **atm nsap-address** *nsap-address* or Switch(config-if)# **atm esi-address** *esi.selector*	Specifies the network service access point (NSAP) ATM address of the interface. or Specifies the end-system-identifier (ESI) address of the interface.
Step 3	Switch(config-if)# **ip address** *ip-address mask*	Specifies the IP address of the interface.
Step 4	Switch(config-if)# **atm arp-server nsap** *nsap-address*	Specifies the ATM address of the ATM ARP server.
Step 5	Switch(config-if)# **exit** Switch(config)#	Exits interface configuration mode.
Step 6	Switch(config)# **atm route** *addr-prefix*[1] **atm 0 internal**	Configures a static route through the ATM switch router to the route processor interface. See the following note.

1.   Address prefix is first 19 bytes of the NSAP address.

Note   Since the 12.0(1a)W5(5b) release of the system software, addressing the interface on the processor card has changed. The ATM interface is now called atm0, and the Ethernet interface is now called ethernet0. The old formats (atm 2/0/0 and ethernet 2/0/0) are still supported.

Note   The end system identifier (ESI) address form is preferred in that it automatically handles advertising the address. Use the network service access point (NSAP) form of the command when you need to define a full 20-byte unique address with a prefix unrelated to the network prefix on that interface. You only need to specify a static route when configuring an ARP client using an NSAP address.

NSAP Address Example

Figure 12-1 shows three ATM switch routers and a router connected using classical IP over ATM.

Figure 12-1   Classical IP over ATM Connection Setup
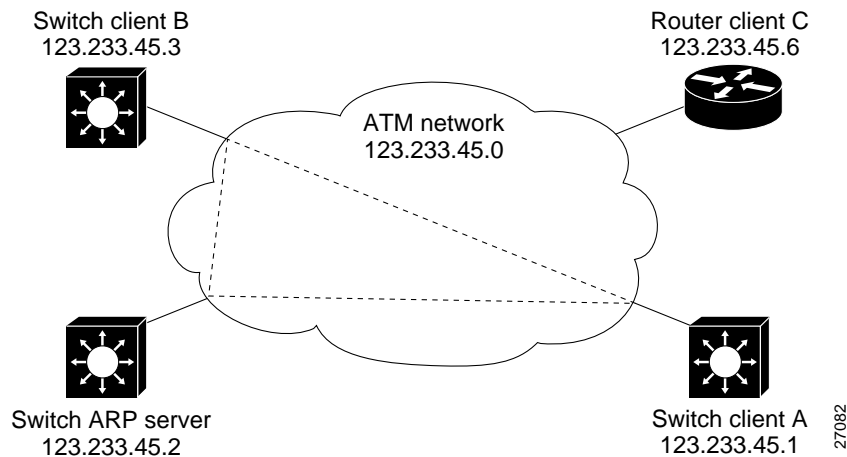
The following example shows how to configure the route processor interface ATM 0 of client A in Figure 12-1, using the NSAP address:

```
Client A(config)# interface atm 0
Client A(config-if)# atm nsap-address 47.0091.8100.0000.1111.1111.1111.1111.1111.1111.00
Client A(config-if)# ip address 123.233.45.1 255.255.255.0
Client A(config-if)# atm arp-server nsap 47.0091.8100.0000.1111.1111.1111.2222.2222.2222.00
Client A(config-if)# exit
Client A(config)# atm route 47.0091.8100.0000.1111.1111.1111.1111.1111.1111 atm 0 internal
```

ESI Example

The following example shows how to configure route processor interface ATM 0 of client A in Figure 12-1 using the ESI:

```
Client A(config)# interface atm 0
Client A(config-if)# atm esi-address 0041.0b0a.1081.40
Client A(config-if)# ip address 123.233.45.1 255.255.255.0
Client A(config-if)# atm arp-server nsap 47.0091.8100.0000.1111.1111.1111.2222.2222.2222.00
Client A(config-if)# exit
Client A(config)#
```

Configuring as an ATM ARP Server

Cisco's implementation of the ATM ARP server supports a single, nonredundant server per LIS and one ATM ARP server per subinterface. Thus, a single ATM switch router can support multiple ARP servers by using multiple interfaces.

To configure the ATM ARP server, perform the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# **interface atm 0**[*.subinterface#*] Switch(config-if)#	Selects the interface to be configured.
Step 2	Switch(config-if)# **atm nsap-address** *nsap-address* or Switch(config-if)# **atm esi-address** *esi***.**selector	Specifies the NSAP ATM address of the interface. or Specifies the end-system-identifier address of the interface.
Step 3	Switch(config-if)# **ip address** *ip-address mask*	Specifies the IP address of the interface.
Step 4	Switch(config-if)# **atm arp-server time-out** *minutes*[1]	Configures the ATM ARP server optional idle timer.
Step 5	Switch(config-if)# **atm route** *addr-prefix*[2] **atm 0 internal**	Configures a static route through the ATM switch router to the route processor interface. See the following note.

1. This form of the **atm arp-server** command indicates that this interface performs the ATM ARP server functions. When you configure the ATM ARP client (described earlier), the **atm arp-server** command is used—with a different keyword and argument—to identify a different ATM ARP server to the client.

2. Address prefix is first 19 bytes of the NSAP address.

Note The ESI address form is preferred in that it automatically handles advertising the address. Use the NSAP form of the command when you need to define a full 20-byte unique address with a prefix unrelated to the network prefix on that interface. You only need to specify a static route when configuring an ARP server using an NSAP address.

The idle timer interval is the number of minutes a destination entry listed in the ATM ARP server's ARP table can be idle before the server takes any action to timeout the entry.

Example

The following example configures the route processor interface ATM 0 as an ARP server (shown in Figure 12-1):

```
ARP_Server(config)# interface atm 0
ARP_Server(config-if)# atm esi-address 0041.0b0a.1081.00
ARP_Server(config-if)# atm arp-server self
ARP_Server(config-if)# ip address 123.233.45.2 255.255.255.0
```

Displaying the IP-over-ATM Interface Configuration

To show the IP-over-ATM interface configuration, use the following EXEC commands:

Command	Purpose
show atm arp-server	Shows the ATM interface ARP configuration.
show atm map	Shows the ATM map list configuration.

Examples

In the following example, the **show atm arp-server** command displays the configuration of the interface ATM 0:

```
Switch# show atm arp-server

Note that a '*' next to an IP address indicates an active call

     IP Address        TTL     ATM Address
ATM2/0/0:
   * 10.0.0.5          19:21   47009181005670000000000112200410b0a108140
```

The following example displays the map-list configuration of the static map and IP-over-ATM interfaces:

```
Switch# show atm map
Map list ATM2/0/0_ATM_ARP : DYNAMIC
arp maps to NSAP 36.0091810000000003D5607900.0003D5607900.00
        , connection up, VPI=0 VCI=73, ATM2/0/0
ip 5.1.1.98 maps to s 36.0091810000000003D5607900.0003D5607900.00
        , broadcast, connection up, VPI=0 VCI=77, ATM2/0/0

Map list ip : PERMANENT
ip 5.1.1.99 maps to VPI=0 VCI=200
```

Configuring Classical IP over ATM in a PVC Environment

This section describes how you configure classical IP over ATM in a permanent virtual channel (PVC) environment. The ATM Inverse ARP (InARP) mechanism is applicable to networks that use PVCs, where connections are established but the network addresses of the remote ends are not known. A server function is *not* used in this mode of operation.

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

	Command	Purpose
Step 1	Switch(config)# **interface atm 0** Switch(config-if)# or Switch(config)# **interface atm** *card/subcard/port* Switch(config-if)#	Selects the route processor interface. If you are using the optional ATM router module, specifies the ATM interface number.
Step 2	Switch(config-if)# **ip address** *ip-address mask*	Specifies the IP address of the interface.
Step 3	Switch(config-if)# **atm pvc** [**0** | **2**] *vci* **interface atm** *card/subcard/port vpi vci* **encap aal5snap** [**inarp** *minutes*]	Creates a PVC and enables Inverse ARP. The VPI value on interface ATM 0 is 0. The VPI value on an ATM router module interface is 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.

Note The ATM ARP and ATM InARP mechanisms work with IP only. All other protocols require **map-list** command entries to operate.

Example

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

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

Displaying the IP-over-ATM Interface Configuration

To show the IP-over-ATM interface configuration, use the following EXEC command:

Command	Purpose
show atm map	Shows the ATM interface ARP configuration.

Example

The following example displays the map-list configuration of the static map and IP-over-ATM interfaces:

```
Switch# show atm map
Map list yyy : PERMANENT
ip 1.1.1.2 maps to VPI=0 VCI=200

Map list zzz : PERMANENT

Map list a : PERMANENT

Map list 1 : PERMANENT

Map list ATM2/0/0_ATM_ARP : DYNAMIC
arp maps to NSAP 47.00918100567000000000001122.00410B0A1081.40
        , connection up, VPI=0 VCI=85, ATM2/0/0
ip 10.0.0.5 maps to NSAP 47.00918100567000000000001122.00410B0A1081.40
        , broadcast, ATM2/0/0
```

Mapping a Protocol Address to a PVC Using Static Map Lists

The ATM interface supports a static mapping scheme that identifies the ATM address of remote hosts or ATM switch routers. This IP address is specified as a permanent virtual channel (PVC) or as a network service access point (NSAP) address for switch virtual channel (SVC) operation.

The following sections describe configuring both PVC-based and SVC-based map lists on the ATM switch router. For a more detailed discussion of static map lists, refer to the *Guide to ATM Technology.*

Configurations for both PVC and SVC map lists are described in the following sections:

- Configuring a PVC-Based Map List on page 12-7
- Configuring an SVC-Based Map List on page 12-9

Configuring a PVC-Based Map List

This section describes how to map a PVC to an address, which is a required task if you are configuring a PVC.

You enter mapping commands as groups. You first create a map list and then associate it with an interface. Perform the following steps, beginning in global configuration mode:

|	Command	Purpose
Step 1	Switch(config-if)# **interface atm** *card*/*subcard*/*port*[.*subinterface*#]	Specifies an ATM interface and enters interface configuration mode.
Step 2	Switch(config-if)# **ip address** *ip-address mask*	Enters the IP address and subnet mask associated with this interface.
Step 3	Switch(config-if)# **map-group** *name*	Enters the map group name associated with this PVC.

	Command	Purpose
Step 4	Switch(config-if)# **atm pvc** *vpi-a 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** *aal-encap*]	Configures the PVC.
Step 5	Switch(config-if)# **exit** Switch(config)#	Exits interface configuration mode.
Step 6	Switch(config)# **ip route** *ip-address mask forward-ip address*	Configures an IP route to the router.
Step 7	Switch(config)# **map-list** *name* Switch(config-map-list)#	Creates a map list by naming it, and enters map-list configuration mode.
Step 8	Switch(config-map-list)# **ip** *ip-address* {**atm-nsap** *address* | **atm-vc** *vci*} [**aal5mux** *encapsulation*] [**broadcast** *pseudo-broadcast*] [**class** *class-name*]	Associates a protocol and address to a specific virtual circuit.

You can create multiple map lists, but only one map list can be associated with an interface. Different map lists can be associated with different interfaces.

Example

Figure 12-2 illustrates a connection configured with a PVC map list.

Figure 12-2 PVC Map List Configuration Example
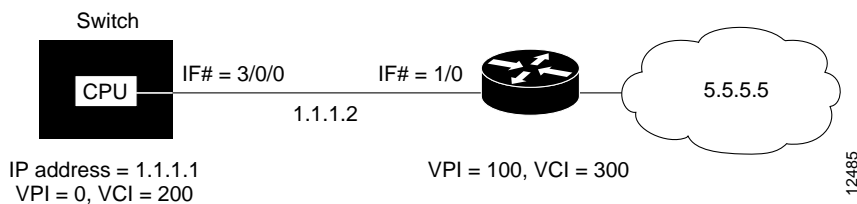
The following example shows the commands used to configure the connection in Figure 12-2.

```
Switch(config)# interface atm 0
Switch(config-if)# ip address 1.1.1.1 255.0.0.0
Switch(config-if)# map-group yyy
Switch(config-if)# atm pvc 0 200 interface atm 3/0/0 100 300 encap aal5snap
Switch(config-if)# exit
Switch(config)# ip route 1.1.1.1 255.0.0.0 1.1.1.2
Switch(config)# map-list yyy
Switch(config-map-list)# ip 1.1.1.2 atm-vc 200
```

Displaying the Map-List Interface Configuration

To show the map-list interface configuration, use the following EXEC command:

Command	Purpose
show atm map	Shows the ATM interface map-list configuration.

Example

The following example displays the map-list configuration at interface ATM 0:

```
Switch# show atm map
Map list yyy : PERMANENT
ip 1.1.1.2 maps to VPI=0 VCI=200
```

Configuring an SVC-Based Map List

This section describes how to map an SVC to an NSAP address. This is a required task if you are configuring an SVC.

You enter mapping commands as groups. You first create a map list and then associate it with an interface. Perform the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# **interface atm** *card*/*subcard*/*port*[.*subinterface#*] Switch(config-if)#	Specifies an ATM interface and enters interface configuration mode.
Step 2	Switch(config-if)# **ip address** *ip-address mask*	Enters the IP address and subnet mask associated with this interface.
Step 3	Switch(config-if)# **atm nsap-address** *nsap-address*	Configures the interface NSAP address.
Step 4	Switch(config-if)# **map-group** *name*	Enters the map-group name associated with this PVC.
Step 5	Switch(config-if)# **exit** Switch(config)#	Exits interface 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*} [**aal5mux** *encapsulation*] [**broadcast** *pseudo-broadcast*] [**class** *class-name*]	Associates a protocol and address to a specific virtual circuit.

You can create multiple map lists, but only one map list can be associated with an interface. Different map lists can be associated with different interfaces.

Examples

Figure 12-3 illustrates an SVC connection configured with a map list.

Figure 12-3   SVC Map-List Configuration Example
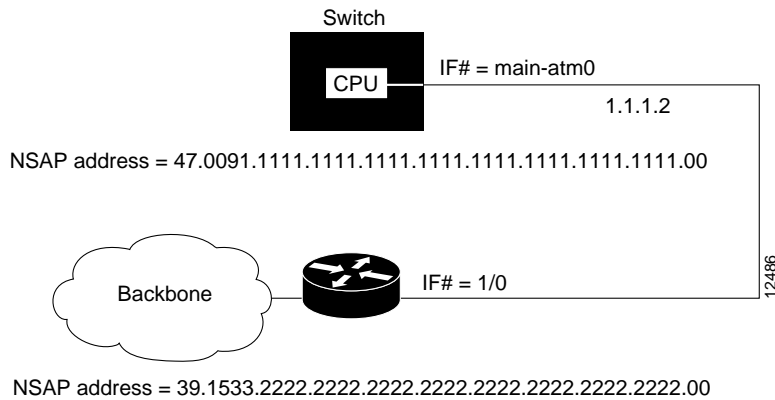
The following example shows the commands used to configure the connection in Figure 12-3:

```
Switch(config)# interface atm 0
Switch(config-if)# ip address 1.1.1.1 255.0.0.0
Switch(config-if)# atm nsap-address 47.0091.1111.1111.1111.1111.1111.1111.1111.1111.00
Switch(config-if)# map-group zzz
Switch(config-if)# exit
Switch(config)# map-list zzz
Switch(config-map-list)# ip 1.1.1.2 atm-nsap 39.1533.2222.2222.2222.2222.2222.2222.2222.2222.00
```

Displaying the Map-List Interface Configuration

To show the map-list interface configuration, use the following EXEC command:

Command	Purpose
show atm map	Shows the ATM interface map-list configuration.

Example

The following example displays the map-list configuration at interface ATM 0:

```
Switch# show atm map

Map list zzz : PERMANENT
ip 1.1.1.2 maps to NSAP AC.15332222222222222222222222.222222222222.00
```